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IN THE

Supreme Court of the United States

OCTOBER TERM, 1965

No. [redacted]/154

SERVO CORPORATION OF AMERICA,
Petitioner,

vs.

GENERAL ELECTRIC COMPANY,
Respondent.

PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

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Petitioner, Servo Corporation of America, prays that a writ of certiorari issue to review so much of the judgment of the Court of Appeals for the Fourth Circuit in the above entitled case as adjudges invalid United States Patent No. 2,880,309 issued March 31, 1959.

Opinions Below

The opinion of the Court of Appeals is reported at 337 F. 2d 716, and is reprinted in the Appendix hereto, A1-A19.* The opinion of the District Court is reported at 220 F. Supp. 473; is reprinted in full at 149a-183a** of the certified transcript; and that portion

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* Appendix to this Petition for Certiorari so indicated herein.

** Petitioner's Certified Appendix in the Court of Appeals so indicated herein.

thereof relating to the validity of U.S. patent 2,880,309 is reprinted in the Appendix hereto, A20-A39. The Report of a Special Master, appointed pursuant to Rule 53, Federal Rules of Civil Procedure, is reprinted in full at 11a-142a of the certified transcript and that portion thereof relating to the validity of U.S. patent 2,880,309 is reprinted in the Appendix hereto, A42-A77.

Jurisdiction

The judgment of the Court of Appeals was entered on September 30, 1964 (A19). A timely Petition for Rehearing In Banc, with respect to so much of the judgment of the Court of Appeals as reversed the judgment of validity of U.S. patent No. 2,880,309 made by the District Court (A40-A41), which in turn had confirmed a Conclusion of validity made by the Special Master (A77-A78), was filed on October 30, 1964. The Petition for Rehearing was denied and an order entered thereon on February 19, 1965 (A20-A21).

The jurisdiction of this Court is invoked pursuant to 28 U.S.C. Sec. 1254(1). The basis of jurisdiction in the District Court was 28 U.S.C. Sec. 1338(a) and 35 U.S.C. Sec. 281.

The Questions Presented

1. Where the District Court and the Special Master specifically found as facts:

> (a) The railroads for many years were plagued by hot journal boxes and although serious train wrecks costing hundreds of thousands of dollars were caused by such overheated journals, nothing was accomplished toward their prevention or detection despite

the fact that there had been a continuing search by the railways and others interested in finding a way by which the overheated journal boxes could be detected before appreciable harm was done (A42-A44, A22);

(b) There were many perplexing technical problems involved in an attempt to successfully detect hot journal boxes by infrared radiation (A51-A52) and the General Electric Company itself, even as found by the Court of Appeals, after ten years of experimental work, abandoned its research and reported the infrared detection of hot journal boxes involved some difficult problems in practical application (A13-A15);

(c) Despite specific requests by railroads to General Electric to develop equipment for the detection of hot journal boxes, G.E. and other large companies, such as International Telephone and Telegraph Co., "never succeeded in solving the problem" (A44-A45, A69-A74, A36-A37) and "of the many experts versed in the art who tackled the problem, none solved it prior to" the invention of the patent in suit and "a few even reached the conclusion that the task was impossible" (A63);

(d) There was admittedly no anticipation in the prior art; nor was there any prior art which would constitute a sufficient teaching to enable one skilled in the art to construct an operable detector embodying the features of the '309 patent; and the patent issued only, as found on the basis of oral expert testimony, after a rigid examination in the Patent Office (A75-A77); and

(e) The invention of the patent constituted a "breakthrough in the hot journal box detection field"

(A57); had the characteristics of a "pioneer" patent (A63); was the "first working answer" to the problem (A37); and received wide industry acclaim as the solution (A63),

the question is presented: Whether the irrefutable* presence of these objective criteria establishes the invention of the patent in suit as an advance in the art promoting the progress of science within the true meaning of Sec. 8, Article I of the Constitution; far removes it from the class of "gadget inventions" condemned by this Court in *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U.S. 147 (1950) and in fact meets the reputedly high standard of invention of that case?

II. Where there has been an unusual and extensive consideration of complicated technical facts, adduced on oral testimony, as in this case where:

(a) The trial of the action involved a total of 33 trial days, a record of 6,541 pages and some 733 exhibits (14a);

(b) The trial of the action, the examination of witnesses and statements of evaluation and analysis of documentary evidence, were all had before *both* triers of fact below, the District Court and the Special Master (A22-A23);

(c) The Special Master, devoting more than 800 hours to the case and a consideration of the evidence, filed a 148 page Report sustaining the validity of the patent and making special note of the weighing of oral testimony; and the District Court, after hearing four days of oral argument, also filed a 34 page opinion confirming the Master's Report in this respect; and

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* Servo Corporation's Petition for Rehearing A80-A82.

(d) The recital of facts by the Court of Appeals is directly contrary to the specific findings made by the triers of fact below with respect to those matters the Court evaluated in testing the claims of the patent against the standard or requirement set forth in the statute relating to non-obvious subject matter (Petition for Rehearing, A80-A93).

the question is presented: Whether this Court should not once again exercise its supervisory powers and call to the attention of the Courts of Appeal the judicial discipline prescribed by Rule 52 of the Federal Rules of Civil Procedure, requiring the Court of Appeals, before it applies a rule of law, or in this case a standard of invention, to a set of specific facts different from those found by the trial court and the master, to specifically find by its own analysis of the record, that such specific findings were clearly erroneous?*

Constitutional Provision and Statutes Involved

This case involves Article I, Sec. 8, Clause 8, of the Constitution, Section 103 of the Patent Code of 1952, 35 U.S.C. 103 and Rule 52(a) of the Federal Rules of Civil Practice, all of which are set forth in the Appendix at A79.

Introductory Statement and Reasons for Granting Writ

We are deeply convinced that the decision of the Court of Appeals has resulted in a substantial injustice; that the invention of the patent in suit, created a new scientific

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* This the Court of Appeals declined to do in its original opinion (A9) and again (A19), when specifically requested to do so in the Petition for Rehearing (A80).

device and an industry which did not previously exist; that the invention of the patent in suit, does not require us to contend for a moderate standard of invention, but in fact meets the "rather severe test" prescribed by this Court in the *A. & P.* case; and that this Court never intended to strike down inventions of the scientific nature of the one in suit by a mechanical or subjective application of a general definition, evolved in another case involving a mechanical "gadget" type device.

Just as this Court has recently indicated significant interest and concern in cases which reflect a lax standard of invention, there should be a correlative interest and concern in cases where the standard of invention is applied in such a rigid and unduly harsh manner, as to render impotent, not only the Constitutional intent of reward in proper cases, but also the incentive to the creation of new and useful things, protection for which permits the individual or the small company to find an entry into industrial life and competition without suffering the abortion caused by immediate appropriation by the more powerful members of the community they seek to join.*

We believe that the facts in this case significantly speak for themselves with respect to the injustice of the result and with respect to the proper application of the standard of invention, ~~and because~~ We believe the facts

* U. S. Senate, Committee on the Judiciary, 84th Congress, 2nd Sess., Sen. Res. 167, "Patent System and the Modern Economy", Study No. 2, p. 15. "The patent system performs an indispensable function in stimulating investment of capital in new manufacturing enterprises. The obstacles in entry into a new business are always great. Existing firms inherently have the advantages of going concerns, adequate capital, a proven product and established customer and supplier relations. The newcomer—even it has a corps of unusually gifted personnel—has a heavy burden in attempting to overcome these many disadvantages. If, however, the new enterprise develops and manufactures a patented product these disadvantages are balanced in some measure by the exclusive market available."

here will afford this Court an opportunity to consider the proper test of invention and its proper application with respect to subject matter which represents the other end of the scientific or technological spectrum in relation to the subject matter of the patents in cases which this Court presently has under consideration,* such as *Calmar, Inc.* v. *Cook Chemical Co.*, October Term, 1964, No. 778 and *Graham* v. *John Deere Co.*, October Term, 1964, No. 580 and that it aptly comes within the request of the Solicitor General to this Court to review a number of cases involving the standard of invention in order to provide a "broad perspective". *United States* v. *Adams*, October Term, 1964, No. 906.

Statement of Facts

The Servo Corporation was formed in 1946 by personnel of Fairchild Camera & Instrument Company who had been engaged in infra red guided missile work until the termination of World War II. At first it engaged primarily in engineering research and development work for the government in infra red technology and later, to provide a stable product line and level of employment necessary to the existence of a small business entity it began to develop infra red devices for industrial applications. Complex technical factors presented considerable problems in attempting to adopt infra red military device technology to industrial applications (184a-189a).

The General Electric Company is one of the largest companies in the world engaged in the development and manufacture of a great variety of products in the elec-

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* For this reason we have set forth the facts in this Petition and supplemented the Appendix to a slightly greater degree than usual but at the same time have sincerely tried to stay within the reasonable limits of a Petition for Certiorari, to the degree that a record as extensive as the one below admitted.

tronic, chemical and metallurgical fields, including railroad locomotives and infra red devices (619a-627a). It holds some 10,000 patents on its developments (Committee on the Judiciary, 84th Congress, 2nd Sess., Sen. Res. 167, Study No. 3). General Electric Company began working on means to detect hot journal boxes by thermal sensing means in 1945 and produced a device which was not commercially adopted (601a-602a; 1067a; 1072a). In 1951 a British associate company of General Electric Co. commenced work on the development of an infra red hot journal box detector and in 1952 the General Electric Company in the United States commenced experimental work on a similar device (1238a-1248a). Such work similarly did not result in any device put in operation on railroads (2.133;* 1268a). The Court of Appeals found that General Electric ceased its activities in this field in 1955; admitted there were difficult problems in application; did not resume its activity in the field until 1958 when it inspected, photographed and obtained the drawings of a Servo infra red detector; and within "an incredibly short time was producing detectors embodying many of Servo's engineering features" (A13-A14).

For many years the railroads had been plagued with what was known as the "hot box problem" (295a; 1084a; 1252a; 1324a). The ends of the axles on a railroad car truck are called journals and they ride on a bearing which consists of a semi-circular piece of brass, surrounded by a lubricated packing intended to reduce the amount of friction created by the rotation of the journal, which bears the weight of the railroad car. These elements are enclosed within a housing which is known as a journal box. Due to wear, loss of lubrication and the inherent defects of such a bearing arrangement, sufficient heat can be

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* The Respondent's, General Electric Co., Appendix in the Court of Appeals so designated herein.

generated in the journal box to cause the journal or end of the axle to actually melt and break off. The usual result of such an occurrence, which remains undetected, is a derailment (294a).

Interstate Commerce Commission reports reveal that for the year 1954, railroads suffered 391 derailments due to overheated journals. For the years 1955 and 1956 there were respectively 545 and 831 derailments due to undetected hot journals. The seriousness of the need for some solution to prevent damage caused by hot journals could not be better described than it was in the testimony of personnel of the Association of American Railroads:

> "• • • *the largest and most important single problem in the field of railroad operations;* it is a problem to which many railroad people have given attention; it is a problem on which railroads have consulted outside research organizations and scientists; it is a problem on which the railroads have spent a great deal of money. The failure to solve the problem has cost the railroads even larger amounts of money. • • •" (317a).

The General Electric Co. itself stated:

> "All railroads are faced with the problem of detecting hot boxes on rolling stock, in particular the Chesapeake & Ohio Railroad Company is interested in obtaining equipment for this purpose. Also the PRR and NYC Companies have indicated considerable interest in such equipment (1252a)."

Because of the importance of this problem, the Association of American Railroads, which comprises 99% of all the Class One railroads in the United States, set up a special committee to consider ways and means for the

detection of hot boxes (295a). During the period 1947 to 1952 this committee evaluated numerous devices which had been proposed and tested by various companies (1058a-1072a). None of these devices proved satisfactory because the "continuance of numerous false alarms and alarm equipment failures makes for an overall unsatisfactory and unreliable operation of the alarm devices under observation and the Committee therefore, cannot yet recommend any hot box alarm for general use (1072a)."

The Servo Corporation commenced its experimental and research work on a hot journal box detector in 1952. Several research workers, Howell, Derganc, Willey and McDonald experimented with a variety of devices (336a-359a; 380a-395a; 397a-398a). It was not until March 1955 that Servo began to embody in a physical device any of the ideas which it had considered in connection with the development of a hot-box detector. At this time an authorization was issued for the construction of a "breadboard" model in the nature of "experimental equipment" (378a).

Thereafter, in an attempt to determine what sort of signals could be obtained from journal boxes, the radiation from normal boxes was attempted to be observed in some tests on the Long Island Rail Road, using an ordinary pyrometer. This was primarily a research instrument utilizing a mirror optical system and a periscope to align the axis of the optical system of the pyrometer. The bolometer or heat sensing element was aimed directly at the lid cover at the level of the axles and at first it utilized a three-bladed device as a chopper, which was removed during later experiments. No permanent record was made of the measurements which were simply produced transiently on an oscilloscope tube. The readings obtained

simply indicated that heat sources were present, and there was no way of associating the heat source with the journal box (378a-385a). At this time the chopper was removed and a microphone was added to the test setup so that the sounding of a click on the microphone would identify the presence of a wheel, and an attempt was made to correlate this information with the pulses which were moving across an oscilloscope.

A graphic and a tape recorder were later also used in an attempt to correlate the presence of the wheel, alignment of the bolometer and to identify and discriminate the heat sources from which signals would emanate. The recordings obtained were to a large extent unintelligible and conveyed no accurate information with respect to the reading of hot journal boxes (391a-393a). Mr. Howell in evaluating this work stated there were "a great many problems that developed beyond the experience" that Servo had at the time he was making these original tests (398a).

The technical problem faced by workers in this field evolved around the nature of infra red sensitive devices and the innumerable heat sources on a moving train and in the surrounding atmosphere. Infra red heat sensitive devices do not measure temperature; what they do measure is relative heat, *i.e.* the change in heat radiation, either higher or lower, from what the heat sensing element first "sees" to the next object passing in its view (326a-327a; 472a-477a; 861a). For this reason most prior art infra red devices employed a blade or a chopper which was interposed between the target and the heat sensing element. When the blade was removed, the heat sensing element then observed the target relative to what it had previously been observing, namely the back of the blade or chopper, the temperature of which, or the standard of radiation from which, could be measured or was known, and hence it could be used as a reference (1394a-1401a;

1402a-1404a). In attempting to single out a hot journal box among hundreds of journal boxes on a railroad train moving at 50-60 miles an hour; discriminate between other journal boxes, hot wheel rims, brake shoes, steam hoses and the like; in bright sunlight, snow reflections, night operation and the like; considering the different sizes and configurations of journal boxes, the different size of the wheels—and to do so with a device that had about 10 milliseconds (10/1000 of a second) in which to make an observation relative to what it had previously been observing—the inventors were presented with a task of significant magnitude (A95-A104).* The General Electric Company engineers who had worked on the problem for about 10 years, stated during the course of this work "a serious problem—that of daylight operation—had not been met nor were we very sure of satisfactory solutions in this respect" and that prior work of a British G. E. affiliate "avoided this most serious problem" by testing a device in a tunnel (A101). They also stated that to locate a heat sensing device in such a manner as to avoid extraneous heat sources and observe only journal boxes, without shuttering, on a continuous basis would be a "large order" (A101).

The extensive nature of the experimental work engaged in by the inventors, Gallagher and Pelino, in an attempt to solve these problems, following their taking over of the initial Howell and Derganc work involved many different aproaches to a solution of the problem suggested by the art and by other workers in the field, including a redesign of the amplifier, germanium shutters and filters,

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* In the Appendix we have printed the testimony of third parties, of the Servo witnesses and the G.E. witnesses—there is no contrary record evidence except the unsupported assertions of G.E. counsel that the problem and its solution were simple and obvious—because we cannot at all comprehend how the Court below could have reached the subjective conclusion that it was simple and obvious.

chopping devices, internal electronic references, and the reading of other heat indications such as the wheel. None of these proved satisfactory, the information obtained being largely unintelligible. (425a-428a; 457a-458a; 460a-462a; 470-474a).

As close as Mr. Gallagher could estimate, sometime near the end of April, 1956, he and Mr. Pelino conceived the idea which became the invention of the patent in suit (485a-487a). Reference to Mr. Gallagher's testimony, whose forthrightness and candor was specially noted by the Special Master (A52-A53), serves better than any lawyer's formulation of language to describe the circumstances:

> "Well, after Mr. Pelino had gotten back from the N. & W. test he had pretty much discarded the idea from his own opinion of looking at the top of the box and become resigned to the fact that the rear of the box would be the best place to lock. We were sitting down one day and I had the *Car Builders Cyclopedia* in front of me as we were discussing the problem and we were reviewing the failures that my circuit had encountered on not being able to get a true ambient reference, nad we had more or less discarded the shuttering idea as being a mechanical difficulty. We had gone through the possibilities of germanium shutters and then in this—in this discussion, and while we were sitting there it dawned on one of us that in order to deal with the problem of a train or car in, say, for instance, Maine in a difficult winter condition and a train in Texas where it was warm, you would have to have something that would give you a standard of comparison because heat is a difficult thing to put in a standard condition. We were looking there—I don't know whether it was triggered off by looking at the book, but

it occurred to us that the car was always in the environment of the target and subjected to the same conditions, whether it be in the winter or summer. We might have gone off on the tangent of thinking how we could use the car as a reference in other manners, for instance as taking radiation from it and developing voltages, and things like that, but then one of us in looking at the *Car Builders* manual noticed a darkened area under the car. That seemed to be a good place. It is out of the sun and there is no snow there. And we began considering the feasibility of loking at the bottom section of the car and not putting all of your heat sources of hot brake shoes and hot wheel rims; and it went rather rapidly from that point on to where we would consider looking in such a manner as to get at the bottom of the car for this referencing and still sweep the journal and miss the remainder of the hot sources.

"This alternately was the arrival at the idea of putting it down on the ties and looking up. From that point, I recollect that I marked in the encyclopedia the angle by putting a protractor and drawing a line on it. This constitutes my recollection of how it happened."

On June 25, 1956 the inventors prepared an Invention Disclosure Memorandum which described their concept (1172a):

"• • • the orientation of the detector head • • • is unique and has a number of advantages over other possible wayside orientations • • •.

"• • • undesired heat sources such as hot brake shoes, hot wheel rims, • • • which are normally present on freight cars, are so disposed as to be outside the viewing field of the detector and targets: namely, the journal boxes. Any other possible orientations

of the pyrometer makes the use of complex and delicate shutter mechanisms mandatory in order to blank out the above mentioned undesired heat sources. Devices incorporating shutters present inherent maintenance problems not the least of which is that of maintaining precise synchronism between the shutter and target.

"Shutters are completely eliminated by the plan of figure 2. The pyrometers see only the journal boxes and the underside of the car overhang which is nearly at ambient temperature."

The orientation of the detector head so as to utilize the underside of the car as an external reference permitted the use of the atmosphere or environment in which journal boxes must be scanned, instead of requiring some method of compensating for it. Daylight and night operations, seasonal and daily variations were self compensating (A52-A53).

A memorandum of the Association of American Railroads dated March 15, 1957 states (1078a):

"* * * work on various devices * * * for the now defunct [A.A.R.] Committee on Hot-Box Alarm Devices had generally led to the conclusion that there was no noticeable relationship between journal box and bearing temperatures alone and that wind velocity and ambient temperature would have a pronounced effect on any such relationship.

"Furthermore, to be effective, the hot-box detector would have to have some automatic compensation for changes in ambient temperature. If the Servo Corporation detector contains such compensation, it is not evident from the description of the device."

That the Servo hotbox detector did solve this problem and compensate for changes in ambient conditions is re-

flected in the following statement by a Pennsylvania Railroad employee (1169a):

> "* * * we do not change the adjustment during winter and summer since the Servo is supposed to account for ambient temperature."

It seems plain that the invention of the patent solved the problem of daylight operation; solved the problem of varying ambient conditions; solved the problem of shutterless operation; and solved the problem of extraneous heat sources, all of which the G. E. Company and its leading infra red expert described as "a large order", a "most serious problem", and ones which "might not yield a satisfactory answer." Yet the solution, which was not obvious to these skilled engineers, was obvious to the Court of Appeals in its attempt to interpret this Court's application of the doctrine of a constitutional invention in the A. & P. case to a device such as a supermarket counter! It is inconceivable that this Court intended its ruling in that case to extend to a contribution such as here in issue which supplied the railroads of this country for the first time with a device which solved what the railroads had for years described as "the largest and most important single problem in the field of railroad operations (317a)".

The proof is overwhelming that the conception of Gallagher and Pelino was not simply a commercial success but was in fact recognized, in a very realistic and practical sense, as a unique solution to a long standing problem. In the light of the failure of any of the prior workers to develop a hot box detector that was acceptable to the railroads (pp. 19-21, *infra*) and the fact that the record does not evidence the detection of an actual hot box under regular operating conditions by any of the prior art

devices, the recognition that the claimed invention provided an answer appears to plainly reside in evidence such as that of Ruff, of the Southern Railway stating:

> "This is the first definite indication I have had that it is possible to externally scan a freight type journal and evaluate the heat therein (TR. 2499)".

The General Railway Signal Company, long a major supplier of communication and signalling equipment to railroads, advised the Southern Railway, which was seeking an alternate source of supply, that it doubted it could independently design a better hot box detector for Southern, and significantly stated:

> "• • • we doubt if more development and research would bring about a better method of indicating hot boxes (11174a)".

Youngwerth of the Erie R. R., which had earlier tested an unsuccessful I. T. & T. (Federal Telephone) device, reporting on the ability of the Servo detector to substantially eliminate false signals, stated:

> "This to say the least, is remarkable when compared with the results we experienced with the Federal Telephone & Radio Corporation detector at North Judson (1097a)."

In 1956 when Servo first tested the device and detected a hot box in operation, with railroad personnel observing, it was reported:

> "This provided Mr. Rockwell [PRR] with the substantiation he required that the Detective had the sensitivity and reliability for this difficult job, and was positively able to detect potentially dangerous journals."

Can there be any doubt in the face of this testimony,* all reflecting awareness, on the part of railroad personnel, for the first time, not only of the ability of this claimed invention to avoid the critical disability of false signals, but even of the ability to detect a hot box. We cannot help but ask this Court, in the light of this practical evidence, to consider the basic soundness of the Court of Appeals' reversing conclusion that the device of this invention *"merely performed the same functions more efficiently"* (A6). The same functions as what? More effi-

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* The Servo detector is also characterized in the statements of many railroads as *"one of the most outstanding advances in railroading"* (Reading RR, December, 1956, 1338a); as a *"very forward step in attempting to solve a very difficult problem"* (Motorola Communications and Electronics Inc., April 1957, 1339a); as representing *"the newest method yet devised to help the railroads in their constant struggle to overcome the hotbox problem"* (Boston & Maine Railroad, September-October, 1957, 1344a); as *"one of the greatest aids to railroading in many, many years"* (C & O 1958 Annual Report—PX-76); as *"tremendously successful"* and producing *"solid achievement"* (B & M, 1959, 1346a); as a *"phenomenal success"* (Interstate Commerce Commission—PX-527); and that it was a *"pioneer"* effort (AAR, 1080a).

An economic appraisal by the N & W Railroad estimated the value of a Servo hot box detector as $325,732 per year, stating the figure to be "conservative" and based on "labor and material savings". (1341a).

And finally, in a paper presented before the I.E.E.E. on February 15, 1963, G.E.'s expert witness Menaker paid the following tribute to Servo's and G.E.'s alleged infringing detectors:

> "The hundreds of infrared hot box detectors [Servo and the alleged infringing G.E.] have without question saved railroads millions of dollars in the last few years. * * * Today's hot box detectors have proven their economic worth repeatedly on the roads that have used them. Railroad management estimates of the time required to pay off the investment have been as short as to weeks. Wherever they are in use, hot box detectors have become as vital to railroad operations as the signal or communications systems."

ciently than what? Not one of the prior art devices was ever commercially adopted or even shown to have successfully detected an overheated journal box in regular operation (A85-A86, footnote).

The work of the Siemens Halske Company in Germany (the Johannson patents, 3.35; 2.270); the work of the General Electric Co.; the work of the International Telephone Co.; and others, all was unsuccessful. The German disclosures both utilized choppers as internal references, one was mounted inside the rails and observed the axle, the other was mounted on a tripod and observed lid covers. There is no record of the commercial adoption of these devices.* G.E.'s expert, Cockrell stated, at the outset of his work, after viewing the Servo detector, "we are going ahead with the development of a hot box detector which does not follow the principles" of the German system (1271a).

The General Electric Company, through its experts, Canada and Warshaw, commenced what they termed a "pioneer" development in 1952 (1252a). The nature of the experimental and development work conducted by them is described in two reports (978a, 1115a) and reveals a mounting which exposed the heat sensing element to hot wheel rims, brake shoes and to variable temperature backgrounds. Noting the problem of horizontal viewing from a pedestal mounted detector Warshaw concluded (978a) that the detector must be installed in an area that will afford protection against low-level sunlight, recommending the location of detectors "* * * in a *cut-through* that will provide adequate shielding from low-level sunlight * * *", or as an alternative arrangement the construc-

* Servo's Petition for Rehearing, Vol. XIII of Certified Record, pp. 115-118.

tion of a natural barrier *"13 feet high"* for a single track or a natural barrier *"15 feet high"* for a double track installation. An admission of total failure of the Canada-Warshaw development effort appears in a 1955 hotbox detector specifications prepared by Canada (1269a):

> "A set of normally open and normally closed contacts are provided on an output [alarm] relay which operates momentarily each time the bolometer detector 'sees' a signal from a passing hot journal on a train *or from another equally hot spot such as brake shoes or a wheel tire."*

This work was summed up by G.E.'s witness, Cockrell, as a device which G.E. would not offer to a railroad (A106).

A further independent effort to solve the hotbox detector problem was made in 1954 by engineers in G.E.'s X-ray Department at Milwaukee, Wisconsin, who also built and tested a pedestal or tripod mounted detector having a viewing axis oriented in a horizontal plane at right angles to the track (1120a). This detector system was tested on the Milwaukee Railroad and the failure of this group of G.E.'s engineers also to build a detector which would satisfactorily discriminate against sunlight and other spurious heat sources is expressed in their 1954 report as follows (1120a):

> "• • • The signals due to the brake shoes can be discriminated against but *short of direct shielding of the journal from the sun's radiation there appears to be no satisfactory answer to the latter."*

During the period 1953-1957, International Telephone & Telegraph Co. tested an infrared hotbox detector which was also pedestal mounted with the viewing axis oriented in a horizontal plane as right angles to the track. One of the features of this detector was a mechanical shutter

which is arranged to open and expose the detector to only journal box lids and remain closed at all other times. The nature of the effort put forth by International Telephone & Telegraph Co. was substantial (1443a):

> "At this writing [I.T.&T.] has expended over $100,000 in developing the invention and has employed from approximately two to ten men almost full time on this project alone since 1953."

The device was unsuccessful and abandoned (PX-198):

> "Hot box detector which the Erie tested was developed by the Farnsworth Electronics Company and offered to the railroad industry by Federal Telephone and Radio Company. It was the intention of the Erie to lease the equipment, as per copy of the October 15, 1956 agreement attached, and to our knowledge no detectors were ever sold by his company. * * *
>
> "The only advice received from the Federal people concerning their future plans in connection with this equipment is that they do not anticipate reinstalling it or conducting any further tests in the foreseeable future."

The General Superintendent of Communications and Signals of the Erie Railroad later reported (1097a):

> "* * * concerning performance of Servo hot box detectors as reported in the current issue of Railway Signaling and Communications.
>
> "In recent months I have discussed this matter with several of the Signal Engineers whose road employs above devices. In each case they advised excellent results being received and claim that of the total number of detector actuations only 20% were false or nothing found actuation. *This to say the least, is remarkable when compared with the results we experienced with Federal Telephone & Radio Corporation detector at North Judson*",

No other conclusion can be drawn from such record facts but that the subject matter of the '309 patent provided, in the complicated field of infra red technology, a solution to a long-standing serious problem, involving the derailment of railroad cars and damages running into millions of dollars, and was recognized as an answer, not merely by the commercial adoption of the device, but by the record statements of electronic and railroad engineering personnel. This result was accomplished by Gallagher and Pelino after recognized expert engineers and large, scientifically oriented companies, including G. E. itself, actually tried to produce a satisfactory result; working with the same materials and sources;* failed; and abandoned their experimental efforts.

ARGUMENT

The Court of Appeals' opinion states (A5):

> "We simply hold that the standard of invention as applied by the master and the district court is not up to the legal standard required by the governing statute, 35 U.S.C.A. § 103."

As we believe we overwhelmingly demonstrated in the Petition for Rehearing the statements of fact in the Court of Appeals' opinion are directly contrary to the specific evidentiary findings of both the master and the district court, and to the substantial weight of the evidence. This is patently apparent from an examination of the Petition for Rehearing** and, as objectively as we are capable

---

* A88-A91.

** Vol. XIII, Certified Transcript of Record in Court of Appeals, pp. 91-134.

of considering it, we cannot comprehend the Court of Appeals' statement that "the basic facts are not seriously in dispute." (A5) Sharp proof of the dispute, which was resolved by the triers of fact in favor of petitioner, is the fact tha G.E. filed 200 separate objections to the master's Report, more than a hundred of which were directed to the findings of fact relating to the invention of the '309 patent, contending that the master was incorrect on the facts.

The findings of fact by the master and the district court (and if there is no dispute as to the facts, these are a valid basis for examining the question of invention) and the record facts set forth in the Statement herein (pp. 7-17, *supra*) plainly show that the invention under examination more than meets the "severe test" of this Court in the *A. & P.* case and overwhelmingly meets the "objective" or "factual" test formulated in recent years by Judge Learned Hand in *Reiner* v. *The I. Leon Co., Inc.*, 285 F.2d 501, 503-504 (C.A. 2, 1960):

> "The test laid down is indeed misty enough. It directs us to surmise what was the range of ingenuity of a person 'having ordinary skill' in an 'art' with which we are totally unfamiliar; and we do not see how such a standard can be applied at all except by recourse to the earlier work in the art, and to the general history of the means available at the time. To judge on our own that this or that new assemblage of old factors was, or was not, 'obvious' is to substitute our ignorance for the acquaintance with the subject of those who were familiar with it. There are indeed some sign-posts; e.g. *how long did the need exist; how many tried to find the way; how long did the surrounding and accessory arts disclose the means;*

> *how immediately was the invention recognized as an answer* by those who used the new variant? In the case at bar the answers to these questions all favor the conclusion that it demanded more intuition than was possessed by the 'ordinary' workers in the field. The needs were known, but the purpose to fulfill them with that minimum of material and labor disclosed in the patent had not appeared; * * * the existing devices at once yielded to Reiner's disclosure; his was an answer to the 'long-felt want'."

In *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U. S. 147 (1950), the last case in which this Court considered the basic question of invention, it was stated (p. 152):

> "The conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable. Elements may, of course, especially in chemistry or electronics, take on some new quality or function from being brought into concert, but this is not a usual result of uniting elements old in mechanics. This case is wanting in any unusual or surprising consequences from the unification of the elements here concerned, and there is nothing to indicate that the lower courts scrutinized the claims in the light of this rather severe test."

Infra red heat sensing devices were not new. Neither was the serious problem of trying to use them for the purpose of detecting overheated journals on railroad cars. The invention of the '309 patent accomplished for the first time the desired result, using as the master put it, "the tools at hand", and was new and "unusual". The record reflects that some engineers thought the task was

"impossible"; that leading experts were uncertain that the technical problems would ever "yield satisfactory solutions"; that after the event, the result was described in the industry as "remarkable". The record reflects that experts had tried, using the tools at hand and could not produce the result. This case is not wanting in "unusual consequences" and meets the "severe test" prescribed by this Court.

This Court further noted (p. 149) that the Court of Appeals in the *A. & P.* case:

> "• • • identified no other new or different element to constitute invention • • •."

The invention of the patent in suit was the only such device to utilize, as a new element, the environment of the target itself, the underside of the car in conjunction with an orientation of the device which constantly exposed it upward towards the sky. As the inventor noted: "It is virtually impossible to achieve the results we are obtaining unless the bottom of the car is used as a reference to which journal temperature is compared. Therefore the orientation [which at the same time avoided other heat sources on the train] is the key to the entire system". As the master found:

> "This was the discovery of the fact that using the tools at hand a device could be made and so oriented as to successfully scan and record only hot journal boxes, to the exclusion of all unwanted and disturbing signals and this could be done by taking advantage of the fact that the underside of the cars provided a uniform reference background."

This case is not wanting in the identification of a new or different element to constitute invention.

CONCLUSION

For the reasons stated this Petition for Certiorari should be granted.

Respectfully submitted,

~~October~~ MAY 19, 1965

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JOHN F. DAVIS, CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1964

No. 154

SERVO CORPORATION OF AMERICA,
Petitioner,

vs.

GENERAL ELECTRIC COMPANY,
Respondent.

APPENDIX
TO
PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

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Opinion of Court of Appeals

UNITED STATES COURT OF APPEALS

FOURTH DISTRICT

No. 9190

Argued April 15, 1964.

Decided Sept. 30, 1964.

SERVO CORPORATION OF AMERICA,
Appellee and Cross-Appellant,

v.

GENERAL ELECTRIC COMPANY,
Appellant and Cross-Appellee.

Patent infringement and unfair competition case. The United States District Court for the Western District of Virginia, at Roanoke, Ted Dalton, J., 220 F.Supp. 473, rendered judgment, and appeals were taken. The Court of Appeals, J. Spencer Bell, Circuit Judge, held that patents relating to use of devices known as "hot box detectors" were invalid and that there had been unjust enrichment.

Remanded.

Before SOBELOFF, Chief Judge, and HAYNSWORTH and J. SPENCER BELL, Circuit Judges.

J. SPENCER BELL, Circuit Judge:

Servo Corporation of America [hereinafter Servo] charges General Electric Company [hereinafter General

Electric] with wilfully infringing three patents[1] relating to the use of devices known as "hot box detectors." Additionally, Servo charges General Electric with acts of unfair competition and unjust enrichment in the deliberate and wilful appropriation and copying of engineering techniques and methods developed by Servo.

In the proceedings below[2] the district court and the master found one of the patents, the '857 Shutter Patent, invalid, and Servo has not appealed from that portion of the judgment. The district court affirmed the master's findings of validity and infringement of the '309 Orientation Patent, but it reversed his finding that the patent had been wilfully infringed. The district court reversed the master's findings of validity and infringement with respect to the '575 Alarm Patent. Finally, the district court rejected the master's finding that General Electric had been guilty of unfair competition by utilizing Servo's detailed engineering data in the construction of General Electric's device. The questions of damages and attorneys' fees were reserved. Both parties appealed. We hold both the '309 Orientation Patent and the '575 Alarm Patent invalid and, therefore, not infringed. We reverse the district court's judgment with respect to unfair competition and unjust enrichment.

---

[1] Patent No. 2,947,857—"The Shutter Patent,"
Patent No. 2,880,309—"The Orientation Patent" (Pelino and Gallagher, patentees—Servo, assignee),
Patent No. 2,963,575—"The Alarm Patent" (Pelino and Remz, patentees—Servo, assignee).

[2] The district court's opinion is reported at 220 F.Supp. 473 (W.D.Va. 1963).

I

The Pelino-Gallagher '309 Orientation Patent.

The '309 Orientation Patent does not claim to have originated the hot box detector as such, but only the position in which such a detector should be placed and the target at which it should be aimed to achieve commercially feasible results. The patent relates to an infrared railroad hot box detector system wherein temperature-measuring devices, generically referred to as pyrometers, are mounted alongside a railroad track in such a position as automatically to inspect the radiated heat from each journal box on a passing train. Electrical signals, proportioned in amplitude to the amount of infrared heat received by the hot box detector from passing journal boxes, are automatically produced by the detector and recorded instantaneously with a pen recorder on a paper chart as the train passes.[3] A heat profile comprising a series of pips is accordingly provided for each side of the passing train and is available for convenient evaluation. Thus the operating condition of any journal box on the train may be ascertained.

Though the patent in question is entitled a hot detector, it correctly acknowledges the earlier development by others of infrared heat-sensitive apparatus capable of sensing the temperature of moving objects, including the journal boxes of railroad cars. It is elemental, of course, that any such apparatus would have to be mounted in such a position as to have an uninterrupted or "line-of-sight"

---

[3] The hot box detector derives its ability to sense the temperature of journal boxes from the use of a temperature sensitive device called a thermistor bolometer. Thermistor bolometers were invented by scientists of the American Telephone & Telegraph Copany and made available for commercial use in about 1950. Both parties to this suit are licensed by the Telephone Company to make and use such bolometers.

view of a journal box (or any other object) whose temperatures was to be observed. Further, since journal boxes on a passing train are interspersed with other heat sources (such as brake shoes, steam hose, and hot wheel rims), it was necessary to provide for the exclusion of signals emanating from these irrelevant sources. For this purpose a method of "gating" was suggested. This was accomplished by magnetic wheel trips which, when run over by the wheels of passing cars, automatically opened or closed the circuit which carried the signals from the scanning device to the recorder. These gating devices were of two types. With one, the circuit was kept open for a predetermined period of time. With the other, by placing two trips on the rail, the first opened and the second closed the circuit. Everything thus far described—the heat-sensing pyrometer, the necessity for a line-of-sight view of the target, and the gating function to cut out extraneous heat sources— were all disclosed by patents for hot box detectors issued before the patent in question.

Thus the Servo '309 patent is in no sense a basic or pioneer patent; it does not purport to have originated the hot box detector as such. Rather, it teaches the position in which such a detector should be placed and the target at which it should be aimed in order to achieve a commercially feasible permanent installation which avoided certain problems inherent in the prior art. This position necessarily was limited by consideration of the physical environment and railroad regulations restricting trackside installations. In the words of Servo's brief:

> "The principal claimed invention of this patent is directed to the definition of the viewing axis orientation and the location of the trackside mounted infrared sensing detector elements in relation to passing railroad cars so as to utilize an advantageous aspect of the car bodies as a uniform background reference against which the infrared heat

radiated by significant portions of the journal boxes is compared."

Thus, the question for the court is whether the discovery of this position as disclosed by the claims of the patent constitutes invention. We hold that it does not.

This answer is not contingent upon resolving conflicting testimony, since the basic facts are not seriously in dispute. We simply hold that the standard of invention as applied by the master and the district court is not up to the legal standard required by the governing statute, 35 U.S.C.A. §103.[4] See *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U.S. 147, 153, 71 S.Ct. 127, 95 L.Ed. 162 (1950).

We think it clear that what Servo has done here is to ascertain the optimum conditions for the use of the hot box detector; and whether this was achieved by experiment in the field, as contended by General Electric, or by contemplation in the laboratory, as Servo contends, is immaterial. The objective was discoverable by experiment, and no new or unique combination of old ideas producing or performing a different or additional function has resulted. *Triumph Hosiery Mills, Inc.* v. *Alamance Industries, Inc.*, 299 F.2d 793, 798 (4 Cir. 1962). As stated by the Court of Customs and Patent Appeals: "It is well settled that a patent cannot be properly granted for the discovery of a result which would flow naturally from the teaching of the prior art." *In re Adams*, 284 F.2d 525,

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[4] 35 U.S.C.A. § 103 provides:

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

527 (C.C.P.A. 1960); *Entron of Maryland, Inc.* v. *Jerrold Electronics Corp.*, 295 F.2d 670 (4 Cir. 1961).

That Servo's scientists were not the first to conceive the idea of a hot box detector mounted below axle level or even at rail level is clearly demonstrated by the file wrapper and especially the Johannson patent. It is also true that they were not the first to conceive the idea of scanning the sides of the journal boxes at or near their tops.[5] Even if they were, the information furnished by the railroads concerning the heat characteristics of hot journal boxes would make this area an obvious target to anyone skilled in the science of pyrometers. Servo is, therefore, reduced to claiming the discovery of the critical angles at which a hot box detector placed below axle level operates most efficiently. Even if we assume that these critical angles are suffciently disclosed by the claims of the invention, particularly claims 5 and 6, we are still left with the principle that criticality is not invention. *Helene Curtis Industries* v. *Sales Affiliates, Inc.*, 233 F.2d 148, 152 (2 Cir. 1956). It is clear that that part of the detector which scans passing journal boxes did not perform any new function when placed in this particular position. It merely performed the same functions more efficently. "Invention is more than recognition of latent qualities in prior art without any physical or objective change in that art." *Zoomar, Inc.* v. *Paillard Products, Inc.*, 258 F.2d 527, 529 (2 Cir. 1958). Servo's elaborate explanation concerning the benefits of the uniform background achieved by its positioning of the scanner does not argue patentability. This is also true of its argument that the toed-in angle more particularly described in claim 6 avoids irrelevant heat sources. These are but rationalizations or explanations of particular adaptation of known and obvious principles—the inevitable result of experimentation. Similarly, while the commercial success enjoyed by Servo's

[5] The patent application was clearly misleading in this respect.

detector leaves no doubt that it has produced a useful device, commercial success cannot produce patentability where none existed before.[6] *Triumph Hosiery Mills, Inc.* v. *Alamance Industries, Inc.*, 299 F.2d 793, 800 (4 Cir. 1962). In *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U.S. 147, 153, 71 S.Ct. 127, 130, 95 L.Ed. 162 (1950), Mr. Justice Jackson wrote:

> "The Court of Appeals and the respondent both lean heavily on evidence that this device filled a long-felt want and has enjoyed commercial success. But commercial success without invention will not make patentability."

The reliance of the master and the district court on the presumption of validity which attaches to an issued patent is misplaced in view of the failure of Servo's scientists to disclose the railroads' contribution to their success. While the master found that the railroads did not specifically inform Servo of the exact area on the journal box which would best serve as a target, there is no question that the railroads had conducted a great deal of experiment and knew the relative temperatures of the various surfaces of the journal box. Even a casual consideration of this information made it obvious that the top and upper sides of the boxes absorbed and radiated nearly three times as much heat from the overheated journal bearings as any other area. It need hardly be said that this being known, the choice of the upper portion of the trailing side of a journal box as preferable to the loosely connected journal box lids or any other area was obvious to anyone

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[6] Nor do we think Servo's argument that the railroads had long sought a solution to the problem will bear analysis. In the first place, Servo did not solve the problem; it contributed a very minor step. In the second place, the possible solution did not exist until the pyrometer was developed in the 1950's. And finally, the railroads were interested in methods of prevention rather than discovery and cure of the hot journal box problem.

skilled in the art. This would explain why Servo soon withdrew from the suit claim 1, which teaches looking at any part of the box except the lid. Thus the optimum target was disclosed to Servo and was no part of its discovery.

Nor can Servo claim that it first conceived the idea of mounting the device below the level of the journal box and specifically at the level of the rails. This was proposed by McDonald about three weeks prior to the earliest asserted date of invention. It was also disclosed by the Johannson patent. While both Johannson and McDonald suggested that the device be placed between the rails, instead of outside the rails, and view vertically upward, Fattor five years before in his proposal to the Association of American Railroads Committee on the development of hot box alarm devices suggested positioning a hot box detector at rail level outside the tracks and viewing the sides of the journal boxes upwardly and parallel to the tracks. While it is true that both the master and the district court doubted that Fattor's proposals received the degree of publicity necessary to constitute prior art and while there is no evidence that Servo ever learned of them, nevertheless they constitute evidence of the obviousness of this position as one which would logically be considered for a permanent installation by anyone skilled in the art. *United States Pipe and Foundry Co.* v. *Woodward Iron Co.*, 327 F.2d 242 (4 Cir.), rehearing denied, 329 F.2d 578 (4 Cir. 1964).

Consequently the track-level and parallel to the tracks view cannot be claimed as Servo's invention because it was either disclosed or obvious from the prior art. And indeed, this position was found not to be feasible, because certain conformations of the railroad cars made it necessary to aim the scanner placed in this position at an angle which caused it to see the sky between certain types of cars. It was this deficiency which inevitably led Servo to move the scanner outwardly from the rails and toe it in

so that it could avoid this drawback. It is the toed-in position described in claim 6 which is the crux of Servo's patent. The so-called invention involved in the toed-in angle of claim 6 was a natural and obvious successor step to the track-level-parallel to the track position of claim 5. Thus the act of Servo in taking one of the known positions disclosed by the prior art and moving the device outwardly from the rail, so as to accommodate the geometry of the truck frames of railroad cars, was not invention; this modification was an ordinary engineering matter obvious to one skilled in the art. Having reached this conclusion, the claimed advantage that the position chosen allows the device to see only the quiescent background of the underside of the car will not render an otherwise unpatentable method patentable.

Having decided that Servo must fail for lack of invention, we do not reach the issue of infringement or the defenses of failure to disclose the best method of practicing the invention, as required by 35 U.S.C.A. § 112, or that detectors embodying the claims of the patent were by the plaintiff placed on sale, sold, and in commercial use more than a year prior to the filing of the continuations in part application on June 30, 1958, as prohibited by 35 U.S.C.A. § 102.

Considering the report of the master, which was extremely detailed and meticulous, and the opinion of the district court, we think that both were so impressed with the novelty, usefulness, and the commercial success of the application of the principle of the pyrometer to the problem of hot journal box detection that they failed to concentrate their attention on Servo's relatively minor contribution to the overall solution of the problem. When this contribution is extracted from the prior art and viewed in isolation, its obviousness is apparent. It does not rise to the statutory standard of invention.

II

The Pelino-Remz '575 Alarm Patent.

The purpose of this device was to receive the signals from the hot box detector, to automatically evaluate these signals, and when they so indicated, to activate an alarm device calling the dangerous condition to the attention of railroad personnel, thus obviating the necessity of maintaining constant supervision and interpretation of the recorder charts. The patent advanced the concept of double differential comparison of opposite axle-end heat signals. In order to do this it was necessary to make two electronic difference comparisons. The temperature of each end of the axle had to be subtracted from the other. If the temperature difference in either case exceeded the preset threshold temperature indicative of trouble, the alarm was activated. An additional function was performed by including in the circuit electronic means for briefly storing the separate axle-end heat signals after they had been passed through an electomagentic gate and amplifier. This was necessary because the two ends of a given axle were sometimes skewed to such an extent that they could not be simultaneously scanned. Finally, the device contained a counting means which counted the wheels or axles which passed the device after an alarm was activated, thus enabling railroad personnel to locate the defective axle promptly.

While claims 3, 4, and 5 are apparatus claims, the basic inventive concept which is claimed for the patent is set forth in claim 20, a method claim. The patent was apparently issued because the applicants persuaded the Patent Office that they first conceived the idea (embodied in this method) of applying existing methods of comparing temperatures, storing signals, and sounding alarms to infrared hot box detection. The district court rejected the findings and conclusions of the master of patent validity.

The uncontested evidence shows that Berti, an employee of the Union Pacific Railroad, wrote Servo nearly 3 years before the invention date suggesting the application of this basic idea to pyrometer hot box detection. True, Berti suggested four scanners simultaneously examining four axles—two on each side of the car—and comparing them for an alarming differential, but Servo almost immediately proposed that the idea be applied to two journal boxes on the same side of the track. Finally Pilcher's contemporaneous notes show that Servo had suggested applying the idea to opposite ends of the same axle at least six months before the collaboration of Pelino and Remz, the claimed inventors. When the field experiments disclosed that a substantial difference in normal operating temperature existed between friction type axles and roller bearing axles, it was a simple and obvious step to utilize this principle in comparing the opposite ends of the same axle in order that the differences between normal operating temperatures of the two types of bearings might not actuate the alarm on the hotter running axle when in fact no danger existed. Thus, the advance, if any, which the Pelino-Remz patent made over the prior existing art was obvious to anyone skilled in this field.

The electronic circuitry involved in the patent is a bridged circuit. To design and use a bridge circuit to compare two electronic signals was conceded by the electrical engineers who testied to be an elementary problem. The use of capacitors to store out-of-phase signals—which might emanate from journal boxes on a skewed angle—prior to comparison clearly reads on the Chubb patent issued in 1926 and others discussed in the record.

We hold that the patent is invalid for obviousness, and consequently we do not reach the question of infringement. Since 3, 4, and 5 are apparatus claims which fall far short of pioneer status, they would, in any event, be limited to the circuitry shown in the specifications. 35 U.S.C.A. § 112.

We think that the master was in error in the standard

of invention which he applied in finding patentability in the '575 Alarm Patent. Utility is conceded, but utility is not novelty, and utility alone is not patentable. *Toledo Pressed Steel Co.* v. *Standard Parts, Inc.*, 307 U.S. 350, 59 S.Ct. 897, 83 L.Ed. 1334 (1939).

III

Unjust Enrichment.

The master found that General Electric willfully infringed and copied Servo's '309 patent in several respects. He concluded that the evidence was not sufficient to sustain a finding that General Electric had copied Servo's '575 patent. The district court, while rejecting the finding of wilful infringement and consequent punitive damages, also found:

> "Similarly, on the question of copying, the Court is of the opinion that from Cockrell's visit to Salisbury and from the work and information flowing from Servo, G. E. gleaned or copied ideas that belonged to Servo under the '309 patent which we hold valid, and insofar as Servo has been actually damaged thereby, it is entitled to recover. But again, to the Court there is not sufficient basis to award punitive damages." 220 F.Supp. at 485.

We think the evidence overwhelmingly supports the master's finding and that the district court erred as a matter of law in rejecting the plaintiff's claim for unjust enrichment. There is ample evidence in the record to support Servo's contention that its relationship with Southern during the installation and testing of its detector at Salisbury, North Carolina, was a confidential one and that Southern understood this. The district court's error lay in its failure to give proper weight to this confidential

relationship in its consideration of Servo's claim. The case is not one of an outright sale without reservations or requirements of nondisclosure. Servo's proposal, on the basis of which the installation was made, contained the following provisions:

> "Servo Corporation of America has a proprietary interest in the information contained herein, and in some instances has patent rights in the systems and components described and requests that you distribute it only to those responsible people within your organization who have an official interest. Insofar as the material contained in this document is novel Servo Corporation of America retains a proprietary interest in its development and manufacture."

The Vice President of Southern in charge of this matter acknowledged that he was familiar with the terms of this proposal. The railroad's interoffice memorandum of March 12, 1955, the letter of May 20, 1955, from Servo's manufacturing agent to the railroad quoting prices for the equipment, and indeed the deposition of the Vice President himself make it clear that Southern understood that it was cooperating with Servo in experimental work. These facts clearly support the master's finding that Southern had entered into a confidential relationship with Servo and thus had a duty of nondisclosure at the time that General Electric's engineers appeared upon the scene.

It is also clear from the record that General Electric ceased its activities in the hot box detector field near the close of the year 1955. At that time its experimental department reported the infrared detection of hot journal boxes as feasible but involving some difficult problems in practical application. Not until the spring of 1958 did a manufacturing department of General Electric again take up this work. At this time Servo had installed its detector on Southern's tracks at Salisbury, North Carolina.

Southern was extremely critical of the price charged by Servo and frankly sought to develop an alternate supply. While this situation existed, a group of General Electric's engineer personnel including most of those who subsequently developed its detector met with the Southern officers in Washington. On April 10, 1958, General Electric's engineers went to Salisbury, North Carolina, where they examined the Servo installation. Members of the party photographed the installation, brought back with them Southern's drawings of the installation, and examined a diagram of the installation made by Servo. From the report made the following day, it was clear that the party had gained valuable information which reflected much, if not all, of Servo's engineering development and field experimentation. There is strong evidence from Southern's files that General Electric requested Southern's permission to make the visit, and further, General Electric's Sales Manager for the hot box detector admitted that he *likely* made the suggestion to go to Salisbury. In any event, we think it immaterial who initiated the trip.

On May 12, 1958, one of General Electric's engineers made a drawing of a detector which it proposed to build for Southern. The device contained most of the principal characteristics of the Servo device, including the so-called critical angles. Southern would not agree to share the development costs, and General Electric did not attempt to build the detector. Not until the Norfolk and Western Railway put up $25,000.00 later in that year did General Electric become seriously interested in producing a prototype device. Within an incredibly short time after this, General Electric was producing detectors embodying many of Servo's engineering features. While General Electric strenuously contends that it was capable of and did in fact develop its detector entirely independent of the information it procured from the Salisbury trip, the master has found differently, and we think the evidence clearly sufficient to support his finding. Nor are these findings over-

come by General Electric's denial of guilt, a denial expressly rejected by the master.

Courts long have recognized that where the holder of a trade secret imparts it to another in confidence and that other person then appropriates it for his own use, equitable remedies may be invoked to right the wrong. That it is not necessary that the trade secret be covered by patent was made explicit by the early and oft-quoted case of *Booth* v. *Stutz Motor Car Co. of America,* 56 F.2d 962 (7 Cir. 1932). There, one Booth disclosed in confidence to Stutz officials his plans for the design of an automobile. The company thereafter utilized these plans in producing a new car without offering recognition or remuneration to Booth. Booth brought an action for damages, alleging two causes of action: (1) patent infringement and (2) wrongful appropriation of his plans. The district court dismissed both counts. On appeal, the Seventh Circuit affirmed dismissal of the first count, holding that Booth's reissue patent involved no patentable advance over prior art and was, therefore, invalid. The court went on to reverse the lower court's dismissal of the second count, holding that Booth had established his right to damages for the company's wrongful appropriation, and remanded the case for the assessment of damages.[7]

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[7] The basis of such damages was stated in *International News Service* v. *Associated Press,* 248 U.S. 215, 240, 39 S.Ct. 68, 72, 63 L.Ed. 211 (1918), where the Court awarded damage to the Associated Press as compensation for its rival's practice of appropriating news releases, as follows:

> "Stripped of all disguises, the process amounts to an unauthorized interference with the normal operation of complainant's legitimate business precisely at the point where the profit is to be reaped, in order to divert a material portion of the profit from those who have earned it to those who have not; with special advantage to defendant in the competition because of the fact that it is not burdened with any part of the expense of gathering the news. The transaction speaks for itself and a court of equity ought not to hesitate long in characterizing it as unfair competition in business."

This court has applied the rationale of the *Booth* case to several cases arising in this Circuit. *Chesapeake & O. Ry.* v. *Kaltenbach,* 95 F.2d 801 (4 Cir. 1938); *Hoeltke* v. *C. M. Kemp Mfg. Co.,* 80 F.2d 912 (4 Cir. 1935), *cert. denied,* 298 U.S. 673, 56 S.Ct. 938, 80 L.Ed. 1395 (1936). Both involved claims for damages for the appropriation of commercial devices, in breach of confidence, prior to the issuance of a patent. As we said in *Hoeltke* v. *C. M. Kemp Mfg. Co., supra,* 80 F.2d at 922-23:

> "The general rule, of course, is that the monopoly of a patent which entitles a patentee to damages for infringement commences only when the patent is granted; but where, in advance of the granting of a patent, an invention is disclosed to one who, in breach of the confidence thus reposed, manufactures and sells articles embodying the invention, such person should be held liable for the profits and damages resulting therefrom, *not under the patent statutes, but upon the principle that equity will not permit one to unjustly enrich himself at the expense of another.* The question was before the Circuit Court of Appeals of the Seventh Circuit in the recent case of Booth v. Stutz Motor Car Co. of America (C.C.A. 7th) 56 F.(2d) 962, and we think the decision there rendered is eminently sound and just. It would be a reproach to any system of jurisprudence to permit one who has received a disclosure in confidence to thus appropriate the ideas of another without liability for the wrong." Emphasis added.)

The continuing validity of this principle was considered and reaffirmed in *Saco-Lowell Shops Reynolds,* 141 F.2d 587, 598 (4 Cir. 1944). Accord, *Friedman* v. *Washburn Co.,* 145 F.2d 715, 718 (7 Cir. 1944); *Picard* v. *United Aircraft Corp.,* 128 F.2d 632, 637 (2 Cir.), *cert. denied,* 317 U.S. 651, 63 S.Ct. 46, 87 L.Ed. 524 (1942). *Cf. Becher* v.

Contoure Laboratories, Inc., 279 U.S. 388, 49 S.Ct. 356, 73 L.Ed. 752 (1929); *Kirschner* v. *West Co.*, 300 F.2d 133 (3 Cir. 1962); *Eckert* v. *Braun*, 155 F.2d 517 (7 Cir. 1946). See generally Annot., 170 A.L.R. 449 (1947).

Because of the confidential relationship which was betrayed here by Southern, this case is distinguishable from *Sears, Roebuck & Co.* v. *Stiffel Co.*, 376 U.S. 225, 84 S.Ct. 784, 11 L.Ed.2d 661 (1964). In that case the action was grounded upon state law which gave a remedy for copying resulting in confusion as to the source of manufacture. In that case the Court held that a manufacturer whose design and mechanical patents are invalid for want of invention cannot under state unfair competition law obtain an injunction against copying its product, nor an award of damages for such copying, as such use of state law conflicts with the federal government power to grant patents. The Court went on to hold that an unpatended article being in the public domain may be freely copied as the federal patent law had preempted the field from state action. This case, however, is one of unjust enrichment through breach of a confidential relationship, and the remedy is derived from the court's power to award general equitable relief. In *Saco-Lowell Shops* v. *Reynolds, supra*, 141 F.2d at page 598, we held:

> "[W]hether the [inventor's ideas] were covered by patent or not, he was entitled to protection against their use by one to whom he had disclosed them in the course of a confidential relationship."

General Electric contends, however, that the information was procured from Southern, not from Servo, and that it breached no confidence existing between it and Servo. We think that General Electric may not so easily insulate itself from liability. The RESTATEMENT, TORTS, § 757 (1939) provides:

> "One who discloses or uses another's trade secret,

> without a privilege to do so, is liable to the other if * * *
>
> "(c) he learned of the secret from a third person with notice of the facts that it was a secret and that the third person discovered it by improper means or that the third person's disclosure of it was otherwise a breach of his duty to the other * * *."

We think the above rule salutary and applicable to the facts present here. General Electric was aware of the confidential relationship existing between Southern and Servo. The detector business was in its infancy—the device in question, while operating sufficiently well to make its use practical, was still the subject of discussions between the parties involving changes and improvements, and it was abundantly clear that the Southern itself was a potential customer for a great many more of the devices. General Electric and Southern were *in pari delicto,* and General Electric may not escape liability in a court of equity.

Several cases have held that a businessman who hires his rival's former employee and induces the employee to divulge the rival's trade secrets imparted in confidence may be required to respond in damages. *A. O. Smith Corp.* v. *Petroleum Iron Works Co. of Ohio,* 73 F.2d 531 (6 Cir. 1934), modified on another point, 74 F.2d 934 (6 Cir. 1935); *Herold* v. *Herold China and Pottery Co.,* 257 F. 911 (6 Cir. 1919). The facts here vary; the principle remains constant. General Electric learned that which it needed to know through Southern, and both parties knew that their concerted activities were in violation of the confidence reposed in Southern by Servo. Under the circumstances the plaintiff is entitled to recover of the defendant the reasonable value of the data acquired and utilized by it in unfair competition with the plaintiff. See *International News Service* v. *Associated Press,* 248 U.S. 215, 39 S.Ct. 68, 63 L.Ed. 211 (1918).

Finally, Servo complains that the district court ignored the mandate of Rule 53(e) (2), FED.R.CIV.P. in failing to show that the master's findings were clearly erroneous. While the court was not careful in its language dealing with the master's report, we think that its was cognizant of the burden placed upon it by Rule 53(e) (2) with respect to the master's findings of fact. In any event, in reversing both the master and the district court on questions of law with respect to the validity of the two patents remaining in the suit, we have rendered largely academic any factual differences of opinion between the two, for we think the factual differences are minor and not relevant to our decision of the legal question. With respect to the issue of unjust enrichment, we find the district court clearly in error in rejecting the master's findings of fact, which we hold to be amply supported by the evidence.

Remanded.

Judgment of Court of Appeals

UNITED STATES COURT OF APPEALS

FOR THE FOURTH CIRCUIT

No. 9190

Appellee and Cross-Appellant

Appellant and Cross-Appellee

SERVO CORPORATION OF AMERICA,
Plaintiff,

-v-

GENERAL ELECTRIC COMPANY,
Defendant.

DECREE

Cross appeals from the United States District Court for the Western District of Virginia.

This cause came on to be heard on the record from the United States District for the Western District of Virginia, and was argued by counsel.

On consideration whereof, it is now ordered, adjudged and decreed by this Court that the decree of the said District Court appealed from in this cause be and the same is hereby affirmed in part and reversed in part; that this cause be, and the same is hereby remanded to the United States District Court for the Western District of Virginia at Roanoke for further proceedings consistent with the opinion of the Court filed herein; and that each side bear its own costs on appeals.

J. SPENCER BELL
United States Circuit Judge

September 30, 1964
Filed September 30, 1964

Circuit Court of Appeals Order on Rehearing

UNITED STATES COURT OF APPEALS

FOR THE FOURTH CIRCUIT

No. 9190

SERVO CORPORATION OF AMERICA,
Appellee and Cross-Appellant,

versus

GENERAL ELECTRIC COMPANY,
Appellant and Cross-Appellee.

Order Denying Petitions for Rehearing

After careful consideration, the court being of the opinion that no good cause is shown, the petitions to rehear filed by both the parties to this appeal are denied.

We think it consistent with the opinion heretofore filed that the district court should allow Servo damages only for General Electric's appropriation of that portion of its work which was not publicly disclosed prior to the visit to Salisbury on April 10, 1958, and that these damages should be measured by General Electric's cost of acquiring the same information by its own experimentation. It is, therefore,

ORDERED that the said petitions be, and they are hereby, denied.

February 18, 1965.

CLEMENT F. HAYNSWORTH, JR.
United States Circuit Judge

SIMON E. SOBELOFF
United States Circuit Judge

A true copy,
Teste:

J. SPENCER BELL
United States Circuit Judge

MAURICE S. DEAN, *Clerk*,
U. S. Court of Appeals for the
Fourth Circuit

By GRACE C. TUCK,
Deputy Clerk

Opinion of Ted Dalton, United States District Judge

A tiny flake of a metallic substance the size of a mouse's toenail, when activated by infrared waves, sets into motion a chain of events which form a background for this important litigation.

An age-old problem confronting railroads everywhere has been the ever recurring "hot journal box" which house the brass bearing that fits over the top of the railway car axle. The method used to lubricate the axle is to use waste, saturated with oil, placed in the journal box of each wheel. By "packing the box" and by frequent inspection, the carriers were able to keep relatively few the number of overheated journal boxes which were of disabling effect on the movement of trains. Notwithstanding all the efforts of the railways in this direction, many "hot boxes" occurred on trains en route, and this frequently resulted in the breakdowns and delays which were quite expensive to the carriers. Consequently, on all sides and for generations, there has been a continuing search by the railways and others interested in finding a way by which the overheated journal boxes could be detected before appreciable harm was done, and thereby facilitate and expedite the movement of railway traffic in this fast-moving age.

A method which, for all practical purposes, solves the problem has been developed, and it is on the question of whether the plaintiff, Servo, is entitled to credit for the result that this controversy arises.

This important action, the trial of which required some 33 days, plus some 4 days of helpful argument by able counsel, with 6541 pages of evidence and 733 exhibits, has been a strongly contested one, and happily, by agreement of the parties, the Court had the benefit of an outstanding

member of the bar of the Western District of Virginia, the Hon. R. S. Kime, to assist the Court as Special Master in the determination of the intricate, technical and difficult issues involved, who spent months in study and preparation of his report.

The service of the Special Master has been helpful in the study, sifting and correlation of the volumes of testimony and exhibits, thus lifting a load of detail work from the District Judge. However, the Court is conscious of its duty and judicial responsibility to decide the issues presented, and it was partly with that thought in mind that the Court sat with the Master throughout the proceedings in this case. To avoid influence on the thinking of the other, neither the Special Master nor the Court indicated to the other his thinking on the issues as the evidence was developed.

THE ISSUES

This action involves the question of the validity and infringement of three patents owned by Servo Corporation of America, namely:

(1) Patent No. 2,937,857, referred to as the '857 "Shutter" Patent;

(2) Patent No. 2,880,309, referred to as the '309 "Orientation" Patent;

and

(3) Patent No. 2,963,575, referred to as the '575 "Alarm" Patent.

(1) The '857 "Shutter" Patent

Special Master Kime, in his report, held the "Shutter" patent invalid for the reason that the results achieved

were obvious to and could be accomplished by one skilled in the are and that there was a lack of novelty or newness in his alleged invention.

No objections were made by Plaintiff, Servo, to this holding of the Master, and the Court agrees fully with and confirms the findings of the Special Master as to the invalidity of said '857 "Shutter" patent.

(2) The '309 "Orientation" Patent

This is the basic patent involved.

The Special Master, in his report, upheld the validity of the '309 "Orientation" patent as to claims in suit numbered 5, 6, 9, 10 and 11, and further found that defendant, General Electric Company, had infringed upon the rights of Servo in connection with said patent, and had copied it in the features essential for successful operation of a hot box detector.

General Electric defended as to the '309 "Orientation" patent on the grounds that the subject matter of the patent would have been obvious to a person having ordinary skill in the art; that it is invalid because of prior public use, sale and publication of its subject matter for more than one year prior to the disclosure of the subject matter to the patent office; that the patent does not disclose the best mode contemplated and known by the patentees for practicing the alleged invention, and that said patent was neither infringed nor copied.

In his finding as to the '309 "Orientation" patent, the Special Master says in his report:

> ". . . The claim of the inventors is that they were the first to construct an apparatus consisting of certain component parts housed in a sturdy metal box (physical models of both the Servo and G. E. detectors were filed as exhibits) to be mounted trackside, preferably on a metal, concrete or wooden base, in such a manner as not to be affected by

the passage of trains, looking upward and inward at such angles (in relation to the rails) so that the apparatus will view only the trailing (lateral) sides of passing journal boxes. Servo claims that it was the first to so construct and mount track-side, below the level of wheel axles, such a device so that its internal components would scan only journal boxes and register their temperature to the exclusion of all other heat sources that would otherwise tend to actuate false signals and that this was accomplished by using or taking advantage of the underside of the cars as a uniform reference background. This manner of mounting and pointing the apparatus is referred to as the 'toed-in' method which the inventors say is the crux of their invention.

"The body of the detector is composed of a heavy outer metal shell with a partial interior shell which, with its air space, tends to keep down the interior temperature of the box. Housed within the box is a lens, bolometer and an amplifier all electrically connected so that the device when mounted track-side and in operation can receive infrared heat waves from passing journal boxes. The metal shutter, which is the subject of the '857 patent, or 'Shutter' patent, and which the inventors claim acts not only as a protection to the delicate internal parts of the detector but as a reference background when the detector is not scanning, opens when the first wheel of the train passes over a magnetic transducer or wheel trip, whereupon, the device is made ready to receive heat signals from journal boxes so long as the train is in motion and as each successive wheel passes over the wheel trip the shutter stays open until a brief interval after the train's departure, whereupon, it automaticaly closes.

"Hundreds of pages of evidence are devoted to a detailed description of bolometers, lens, shutters, amplifiers and circuitry and the part each and all play in connection with hot box detectors. An almost equal number of pages deal with various types of wheel trips, mechanical, magnetic and electrical, the function of which is to open the protective shutter of the detector and while the train is in motion gate through to the recorder the heat signals from passing journal boxes. This gating is generally denominated as *time* gating, where the signal is of a fixed duration, or *space* gating, where the signal is gated through for a time space which is governed by the speed of the train. Space gating is generally accomplished by the use of two wheel trips or transducers.

"Both Servo and G. E. use in their equipment the 'thermistor bolometer' patented in the 1940's by Bell Telephone Laboratories but marketed by Western Electric, both being affiliates of the American Telephone and Telegraph Company — licenses to use such equipment having been granted to Servo and G. E.

"Plaintiff and defendant agree that the thermistor bolometer has aided greatly in the receptive diagnosis of infrared signals from heated metals, especially in the hot journal box field area. Servo is licensed to manufacture thermistor bolometers, which are extremely sensitive to infrared heat waves. These waves are passed on to the bolometer through a lens which is located in a tube or barrel in front of the bolometer. The function of the lens is to act as a filter so as to pass on to the bolometer only waves of a certain length; the infrared energy waves being in a range from about 2 to 12 microns.

"The lens problem was early found to be a most difficult one. Ordinary glass will not permit the passage of infrared energy waves. Various substances were experimented with and Servo came up with an arsenic trisulphide lens which it called 'Servofrax lens.' This proved to be the most satisfatcory type of lens for hot box detection purposes. When the shutter opens, the arsenic trisulphide lens permits the infrared energy waves to pass through to the thermistor bolometer, composed of two elements arranged in a bridge circuit. The active flake only of the bolometer receives the energy from the infrared waves causing it to change its resistance, with respect to the inactive element of the bolometer which, in turn, brings about a differential electrical output from the bridge. The amplifier then amplifies this voltage to a point where sufficient power is generated to make a recording on a tape or sound an alarm.

"Amplifiers are either of the D-C (direct current) or A-C (alternating current) type.

"It was soon learned that a D-C amplifier would not successfully function in a hot box detector other than possibly a laboratory model. G. E.'s expert, William D. Cockrell, admits this and Warshaw found this out in his 1949 experiments. The A-C amplifier is used by both Servo and G. E.

"The A-C amplifier has desirable operating characteristics in that its gain can be made uniform and it is substantially independent of power supply voltage variations, the smallest changes in which creates a drift problem in a D-C amplifier. When, however, an A-C amplifier is used in an instrument to scan hot journal boxes, it has the disadvantage of becoming saturated and thus fails to pass informative signals for a short period of time after the detector has viewed an extremely hot or cold

source, just prior to viewing the journal box (in this case the target). The experts for both Servo and G. E. agree on this.

"Benjamin Cooper, another of G. E.'s experts, testified that an A-C amplifier acted as though it had a memory recording the history of what happened previous to it, whereas, a D-C amplifier does not have a memory. The importance of this is of great significance in the practical application of the use of a thermistor bolometer in a hot box detector. If the bolometer is exposed to any source (other than a passing journal box), such as the sky, snow, reflections from a bright object, or an unfavorable background, from which infrared heat waves emanate, the bolometer will pass the signal through to the amplifier which may thus become saturated and a false signal or recording will result.* Servo claims that its orientation invention solves this most difficult problem by mounting its detector track-side below the level of passing journal boxes, angled upward and inward so that the bolometer, when not receiving heat waves from journal boxes, is focused on the underside of the passing cars, which provide a quiescent background, the ambient temperature remaining the same during the day or night, and throughout all seasons of the year, regardless of the direction of the movement of the train, and that the temperature of which, in relation to the journal boxes, can be accurately determined to the exclusion of other discordant heat sources so as to detect only overheater journal boxes. This Servo claims can be done, even without gating through the signal when otherwise only the journal box is in view. G. E. claims that orienting the detector is perfectly ob-

"* As will hereafter appear, G. E.'s electronic expert Cockrell insists the role that the amplifier plays is more important than the manner in which the detector is oriented."

vious, even to one unskilled in the art, and that this method, at least as to the mounting of the detector track side and angled upward, is disclosed by the prior art. G. E.'s experts and its counsel contend that the secret of successfully viewing overheated journal boxes resides in a combination of a proper filtering lens, a thermistor bolometer and a non saturating amplifier. The record contains no evidence that a non saturating amplifier is as yet available. G. E.'s Cockrell, . . . who admittedly is the father of G. E.'s hot box device, one of its top electronic engineers, and the publisher of a text book on 'Industrial Electronic Control' (later edited as an 'Industrial Electronic Handbook') when cross examined on the use of amplifiers, testified as follows: (R-4315-16)

'Q. So this was not important; the viewing angles were not important? A. So far as I am concerned, the viewing angle was not important then; it is not *extremely* (emphasis supplied) important now; except as a crutch for an infrared amplifier. If we had a perfect D-C amplifier, we would not worry at all about angles.

Q. Oh. well, do you have perfect D-C amplifier today? A. We do not.

Q. Oh, I see. So the use of this equipment so far as orientation and angles is concerned is to some extent limited by the fact that you had an A-C amplifier to work with, only? A. I am afraid that's a fact of life.'

"Again, (R-4450) when questioned by G. E.'s trial counsel, Cockrell said:

'. . . and I think the court will appreciate if we had an amplifier which would not saturate, which would not change its calibration over the days and we could then so gate that amplifier that

only the signal that came from the bolometer as we were looking at the journal—we would have an excellent output *with very little to bother from the outside influence* (emphasis supplied). Since we cannot have a perfect amplifier, we make the best we can and then use these various crutches for protection of the bolometer against strong outside light and that type of thing to assist it.'

"Cockrell characterizes the 'toe-in' viewing angle as one of the crutches. While constantly stressing the importance of the role the amplifier plays in the successful scanning of journal boxes, yet he is nevertheless forced to admit its present limitations which necessitates the use of his so-called 'crutches.'

"The thermistor bolometer is patented and used by both Servo and G. E. Servo asserts no inventive claims as to its arsenic trisulphide lens, likewise used by both. The A-C amplifier is an integral part of the equipment of each. None of these elements of the detectors of plaintiff and defendant, together with their electrical circuitry, are directly involved in Servo's invention claims relating to its 'orientation' '309 patent, other than they constitute essential components of the detector of each.

"The amplified output of the bolometer, which reflects changes in the infrared radiation which falls upon it, is employed by both parties to actuate pens of a recording galvanometer. These recordings are made on a tape. Detectors are mounted, one on either side of the tracks so that the temperature of each end of the axle can be read; thus, there are two lines produced on the paper tape of the recorder. Each line contains a series of pips, the height of the pips above the base line indicating the temperature of passing journal boxes.

There are several kinds of recorders. Sanborn recorders are standard equipment for both Servo and G. E. These recorders can be placed near the vicinity of the detectors or may be placed some distance away. In actual operation it is desirable to mount the detector trackside several miles beyond a railroad repair yard and transmit the signal to the recorder located within the yard. The tape is thus read at a point considerably in advance of the incoming train. An experienced operator can thus determine, from studying the tape, if there are overheated journal boxes on any of the cars. There is no contention on the part of either as to its right to make use of recorders.

"Those who sought to solve the hot box journal problem were faced with many perplexing difficulties. Aside from the selection, assembly and housing of the internal components of an apparatus designed to view journal boxes of passing trains, it was also necessary to take into consideration many factors such as: the type of journal bearings, whether friction or roller, the shape of the journal box,* the varying diameter of the wheels, the sway or motion of the train, as well as its speed, the portions of the journal box to be scanned, whether the lid, top, bottom, leading or trailing sides, the heat sources on the train, such as brake shoes, steam hoses, etc., and especially outside disturbing factors, the sun, clouds, snow, reflections and any unfavorable background. Added to all of this is the fact that railroads, of necessity, must make use of rugged and exacting equipment, designed to be utilized in an environment

"* Journal boxes housing roller bearings are generally smaller, more rounded, and do not protrude as far, measured from the end of the axle, as do friction journal boxes and hence proved more difficult to bring within the view of the scanner."

where utility and dependability are essential. While G. E. insists otherwise, there was no real breakthrough or solution of the problem until Servo's Gallagher and Pelino collaborated."

The Special Master details the conception of the '309 "Orientation" idea by Gallagher and Pelino of Servo in April, 1956, when they began "looking in such a manner as to get at the bottom of the car for this referencing and still sweep the journal and miss the remainder of the hot sources."

And the Special Master concluded:

> "The evidence clearly demonstrates that, despite G. E.'s insistence to the contrary, no one prior to the combined undertakings of Gallagher and Pelino had ever come up with a practicable or successful 'Hot Box Detector.'" (Master's Report, p. 24)

Further, the Master found :

> "I find from the evidence before me that Servo made a true break through in the hot journal box detection field and that there is novelty, utility and unobviousness in the discovery. As to utility, there can be no question. The defendant acknowledges this and, more importantly, substantiates it by manufacturing and selling hot box detectors embodying all the essential features of Servo's detectors. In fact, the vertical and toe-in viewing angles are almost identical. At the time of the trial, both Servo and G. E. had somewhat refined and standardized their products. In August, 1960, Servo had sold or leased some 200 detectors and G. E. approximately 117." (Master's Report, p. 26, 27)

Continuing, the Master said:

> "In standard practice Servo scans at a vertical angle of 25° and toed-in angle of 10°. G. E. scans at a verticle angle of 26° and an acute angle of 8°. Servo learned that in order to view all types of journal boxes and yet use the underside of the train as a reference background it was necessary to move its detector a little further from the rails and toe it in slightly—this, however, necessitated the lowering of the vertical angle. G. E. learned from Servo . . . and merely made a slight change in the two angles, producing however, the same result.
>
> "G. E. insists that claim 5 of Servo's patent '309' is indefinite and cannot be construed to embrace specific claim 6, which is referred to as the 'toe-in claim;' that claim 6 must stand or fall without the support of claim 5, which is not a generic claim, and that Servo had discovered the 'toe-in method' and employed it in detectors leased and sold to railroads more than one year prior to June 30, 1958, the filing date of its continuation in part application, based on its original parent patent application filed November 6, 1956. Further, G. E. insists that claim 6 of the 'Orientation' '389 patent is barred by virtue of the fact that Servo Publication SE-23 (DX 69) read in conjunction with a letter from Servo to the Virginian Railway Company, dated June 30, 1957, which G. E. claims is typical of similar letters sent to other railroads, described the toed-in form of the invention; and finally, G. E. relies on a publication in the Railway Age, dated July 1, 1957, but actually published—G. E. contends—before the date it bore." (Master Report, p. 28)

The Master, upon examination of claim 5 of the '309 "Orientation" patent, held that it was a broad and generic claim.

Essentially, the Special Master holds that the claim of the '309 "Orientation" patent covered the location of the detector along side a section of the track which would scan the journal box of the car at a proper vertical angle and a proper toed-in or acute angle which would successfully achieve the desired results of hot box detection; that this idea originated with Servo and that was picked up and adopted by G. E., with modifications, but retaining the important principle of orientation or mounting.

The Court adopts the findings of fact of the Special Master to the effect that Servo was the first to successfully put the essential elements of a detector together in a working combination and to find the proper location and the proper vertical and toed-in angles for the hot box detector, although the Court has some misgivings as to whether the idea was originally conceived by Servo.

Fattor in 1949 and in 1951 was striking close to the problem, but for financial reasons his ideas were not patented, nor was there sufficient publication of Fattor's work to affect the granting of the '309 patent to Servo. In fact, there is absence of proof that Servo know of Fattor's work.

Again, there is evidence of other investigation and experimental efforts (prior to Servo) directed toward solution of the problem, including the work of Warshaw (G. E.) in 1954, and various railway companies. But once the patent office, in face of all the prior art, granted the patent, the Court is met with the presumption that the patent is valid.

From the outset of the trial, it has been the Court's view that the controlling issue in this case is whether Servo, using the thermistor bolometer, magnetic wheel trips, shutters and other items necessary in combination to construct a hot box detector, was entitled to claim a valid patent by reason of it (Servo) being first to position the detector at a point where it would work successfully.

To the Court the preponderance of the evidence seems to support the conclusion of the Master that Servo was first in placing the detector alongside the track at a place where it would scan and record hot journal boxes, and where the detector would exclude undesirable signals and would view the journal box at the most desirable spot. As to this fundamental finding, the Court adopts the result of the report of the Special Master, notwithstanding the quaere which has perplexed the Court from the beginning of this trial, namely: Is the idea of location or positioning of the device a patentable one? In other words, is a position in space patentable? These misgivings on the part of the Court have been somewhat allayed by the admission of counsel for G. E. in the argument before the Court on exceptions to the Master's report—at which time counsel for G. E. (in answer to a question from the Court) expressed his view in the affirmative, with reservations as to circumstances.

The ingredients of the detectors were obvious to one skilled in the art, but it is the Court's view, as it was the Special Master's, that Servo was the first to conceive and put into successful operation the detector located at a viewing point that would achieve the desired result. By reason of the fact that Servo was the first to discover and put into successful practice the proper viewing position, the Court confirms and approves the Special Master's findings on the '309 "Orientation" patent, and therefore holds the '309 patent valid, and further that it was infringed by General Electric.

In so holding, the Court has considered carefully G. E.'s defense to the '309 patent, which defense is fourfold and in substance contends:

(1) that the subject matter of the patent would have been obvious to a person having ordinary skill in the art;

(2) that it is invalid because of prior public use, sale and publication of its subject matter for more than one year prior to the disclosure of the subject matter to the patent office;

(3) that the patent does not disclose the best mode contemplated and known by the patentees for practicing the alleged invention; and

(4) that said patent was neither infringed nor copied.

(1) Obviousness

In the argument of counsel for G. E., it was urged that obviousness was shown by the clearance requirements of the railways, and by the suggestions and work of McDonald, Pilcher (of the Norfolk and Western Railway), and Whitehead (of the Pennsylvania Railway).

One answer to the clearance argument is that there were places other than the Servo viewing point that would conform to clearance requirements and still fail to measure up as a successful hot box detector. Another thought is that one could have given up as hopeless the idea of making a workable detector in face of the rigid clearance requirements. A further observation is that although the railway clearance requirements were known to G. E. beforehand, G. E. did not adopt the Servo positioning until it knew from the Salisbury inspection the Servo "look".

As to Mr. Pilcher's contribution, the Court was impressed with his fairness as a witness, but at the same time, the Court must say that Mr. Pilcher was not positive and definite in his testimony as to where the idea of positioning came from. Mr. Pilcher's answer, "I think it came from me", is insufficient to prove, in face of all the other evidence, and reasonable inferences to be drawn therefrom, that it came from Mr. Pilcher.

Similarly, as to McDonald and Whitehead, the Court is unwilling to overturn the Master's findings by reason of

the alleged suggestions of Mr. Whitehead of the Pennsylvania Railroad or Mr. McDonald of Servo—bearing in mind that the District Court is controlled by the provisions of Rule 53(e)(II) which provides that the Court shall accept the Master's findings of fact unless clearly erroneous, as it is stated in *London* v. *Troitino Bros. Inc.*, 301 F. 2d 116 (1963).

The best answer to G. E.'s defense of obviousness is the cold fact that notwithstanding the great need for a successful hot box detector by the railway industry and notwithstanding the constant quest for a solution to the problem, it was not until Servo located the proper viewing position that the device became a practical answer. The problem of locating the detector at a point which would view the most favorable spot of the journal box on a moving car under changing conditions, taking into consideration other factors of heat, light and atmosphere obtaining, was a difficult problem to solve, and as before stated, Servo was the first to come up with a working answer. The Court does not feel that finding this answer was as simple as defendant urges, or that it possessed the obviousness referred to and described in the Patent Act, which would defeat it. (35 U.S.C. 103)

An excellent discussion on the test of obviousness applicable here comes from our own Fourth Circuit and is set fourth in *S. H. Kress & Co.* v. *Aghnides*, 246 F. 2d 718, and *Honolulu Oil Corp.* v. *Shelby Poultry Co.*, 293 F. 2d 127, *and Entron, Inc.* v. *Jarrold Electronics Corp.*, 295 F. 2d 670.

Prior Art

In this case there has been considerable evidence and discussion of prior art. The record embraces many pages of what was done by Canada, Warshaw, Orthuber, Johnson, Howell, Willey, The British Thompson-Houston Company, various railroads, and others in pursuit of the solution to the hot box detector problem. However, G. E.

in its objections to the Master's Report states that no contention is made that the '309 patent was anticipated by the prior art.

The position of G. E. is that the prior art is to be considered on the test of obviousness—in other words, that the accomplishments of the various persons working with the hot box detector problem prove that the subject matter of the '309 invention was obvious to others having ordinary skill in the art. The faulty premise is that these various inventors did not succeed. The Court, confronted with the presumption of validity of the patent granted by the patent office, does not feel that the test of obviousness has been overcome by G. E. Quite true, in retrospect the assemblage of the detector ingredients and placing the same in the right location to do the job now appear relatively simple to one of the ordinary skill in the art, but the test of the need and how long the need, the many efforts of trial and error, and the recognition of the invention as an answer, and the use by G. E. itself,* all add up to the

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* G. E. scans at an acute angle of 8°—Servo at an acute angle of 10°. G. E. scans at a vertical angle of 26°, whereas, Servo at 25°.

fact that it was not an invention obvious to one of the ordinary skill in the art.

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Counsel for the plaintiff has made citations of over one hundred decided cases and text references, and defendant has likewise made reference to many authorities on the legal problems presented. The Court has not undertaken in this opinion to discuss the various citations of counsel, but will say that out of the host of authorities cited no case is found which holds precisely that a position in space is patentable. The two cases which appear to strike closest to the point on the basic '309 patent are:

Eibel Process Co. v. *Minn. & Ontario Paper Co.*, 261 U.S. 45 (1923);

Drive-In Theatres v. *Park-In Theatres*, 174 F.2d 547.

In the *Eibel* case, the Court observed that the change of position was in the machine *itself* and was not a *position* in space. On this, Mr. Walker, chief counsel for defendant, responded, "I honestly don't think it is a distinguishing characteristic; in other words, in theory, I would say there is nothing which inherently disqualifies from patenting the selection of a position." (Tr. Argument p. 203-4). Confronted thus by this admission of counsel, coupled with the presumption of validity, and finding no authority to the contrary, the Court, for reasons stated herein, is upholding the '309 patent.

The *Theatre* case, although possessing similarities, is not sufficient to overthrow the Court's holding of validity for the '309 patent.

An order will be entered in accordance with this opinion.

TED DALTON.
United States District Judge

June 22, 1963.

Judgment of the District Court

This patent having come before the Court on defendant's Motion to Reject in Part the Master's Report and to Enter Judgment In Favor of Defendant and this Court having heard, read, and considered the pleadings, proofs, briefs and arguments submitted by the parties, together with the report of the Special Master and having rendered an opinion, filed herein, constituting its findings of fact and conclusions of law,

It is hereby ORDERED, ADJUDGED and DECREED as follows:

(1) Claims 5, 6, 9, 10 and 11 of the United States patent No. 2,880,309 are valid and are infringed by defendant's devices in suit and as to this conclusion of the Special Master, his report is approved and confirmed.

(2) Claims 3 and 4 of United States Reissue Patent (shutter) No. Re 24,933 are invalid and are not infringed by defendant's devices in suit which is the conclusion of the Special Master and his finding is approved and confirmed.

(3) Claims 3, 4, 5 and 20 of United States patent No. 2,963,575 are invalid and are not infringed by defendant's devices in suit. The Special Master found said claims valid and infringed and as to this finding said verdict is rejected.

(4) The Court as to unfair competition is dismissed.

(5) The count as to violation of the antitrust laws is dismissed.

(6) An injunction is hereby awarded as to United States Patent No. 2,880,309 enjoining and restraining defendant from further infringements upon said patent.

(7) The Court holds that the plaintiff is entitled to recover of defendant actual or compensatory damages for

infringement of said '309 patent, the amount of damages to be hereinafter determined upon a proper accounting, but punitive or increased damages is denied.

(8) This case is referred to Hayden Anderson, C.P.A., of the firm of Anderson & Reed, Roanoke, Virginia, for an accounting as to the damages sustained by plaintiff by reason of the infringement of the '309 patent by the defendant.

(9) The question of attorneys' fees is held in abeyance, although the Court at this stage of the proceedings does feel that this is the exceptional type of case in which counsel fees should be awarded to the successful litigant.

(10) Plaintiff shall recover its costs from defendant, to be hereinafter determined by the Court.

(11) Defendant, desiring to appeal from this judgment and plaintiff desiring to file a cross-appeal, the execution of this judgment is suspended for a period of thirty (30) days.

/s/ TED DALTON
United States District Judge

Dated: June 25, 1963

Report of Special Master

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The Problem

For a great many years railroads have been, and still are, plagued by "hot journal boxes" in railroad parlance "hot boxes." These occur primarily in connection with the operation of freight trains. Due to the advent of diesel engines, freight trains are made up of many more cars than formerly. The longer the freight train the more probable becomes the danger of a "hot box" developing. There are in the United States over 200,000 miles of main line tracks. Over these tracks thousands of trains operate daily, made up of cars differing considerably in their configuration. Nearly all freight cars—whether they be box cars, gondolas, coal hoppers, flat cars, refrigeration cars or tank cars—are equipped with friction bearings. Only a small percentage have roller bearings. The car body rests on trucks, each truck composed of a frame, springs, two axles and four wheels. Even the wheels vary in size, due to constant wear. The end of the axle (each end) protrudes through what is known as a journal box. The journal box houses a babbitt lined curved brass bearing that fits snugly over the top of the axle. This bearing is held in place by a metal wedge. The weight of the car rests on the bearing. The bottom of the journal box is concave and forms a recess below the axle which turns in the box.

The method employed for a great many years to lubricate the turning axle or journal was to place oil and oil saturated waste into this recess. This waste, or in railroad parlance termed "dope", was composed primarily of matted cotton threads—the cotton threads were found to retain their oil saturation qualities better than other kinds of thread. As the axle turned, the oil from the threads lubricated the bearing, reducing the friction between the bearing and the turning axle thus tending to stabilize the

temperature that otherwise would quickly build up in the journal box. In order to pack the journal box from time to time, as well as inspect it, the box is equipped with a large lid, generally made of iron and hinged at the top. Each car is thus equipped with two trucks, with springs, four axles, eight wheels and eight journal boxes. On account of the structure of the truck frame not as much of the trailing (rear) side of the forward journal box is exposed as is the case with following journal box. The importance of this relates to the width area of the lateral (back) sides of the forward and trailing journal boxes that are exposed to scanning when the scanner or detector is mounted track-side below the level of the train axle in a manner so as to view the journal boxes while the train is going away from the detector. This method of scanning is now being used by both Servo and G. E.

The railroads have long been faced with two problems relative to hot boxes—one to prevent them—the other to detect them—before damage is done. While G. E. rather insists that the Association of American Railroads (known as the A.A.R.) and to which most of the primary railroads of this nation belong, centered its attention on finding ways to prevent the occurrence of hot boxes, yet the record discloses that no progress of any consequence was made toward the solution. As testified to by the witness Pilcher (Engineer of Tests, Norfolk & Western Railroad), experiments were made with various oils, and oil pads were adopted (R-1038-42) some eight years ago by the Norfolk & Western and now are almost exclusively used by most railroads. These pads simply stay in place better than the waste but do little to prevent the occurrence of hot journal boxes. Although overheated journal boxes causing, in many instances, the end of the axle journal to be wrung off, resulting in serious train wrecks, costing the railroads of the country hundreds of thousands of dollars, continue to take place with greater frequency due to longer and speedier trains, nothing (other than the time

honored method of manual inspection) was accomplished toward their prevention. The problem of detection remained foremost.

G. E. further takes the position that the railroads in the late 1940's and early 50's were not receptive to the idea of detection through the medium of various suggested devices and would not lend their support and cooperation, especially in a financial way, to the solution of the problem. In fact, G. E. stresses the point that it could have solved the problem in connection with its experiments in this field in 1952 through 1955 but insists the railroads were not ready to be convinced and, for this reason, its business management called a halt in all further operations in this field. This was disclosed and, in fact, emphasized in the deposition testimony of Dr. Louis T. Rader, who stated he was "General Manager, Specialty Control Department, Industrial Electronics Division, G. E." Defendant, on page 73 of its opening brief, quotes from Dr. Rader's testimony to this effect. In fact, the brief makes the outright statement that G. E. elected at that time not to offer a hot box detector on the commercial market for business reasons and "not because of any inability to cope with any techinacl problems." This statement is almost inconceivable in view of the fact, as the record amply discloses, G. E. had been urged by the Chesapeake & Ohio Railway Company to furnish it the necessary equipment required to make a trial installation "at some point on our road." The request was also for all engineering information and approximate cost of equipment to make the trial installation. This was in May, 1953, and involved the same railroad that several years later became one of the proving grounds for the Servo equipment. Other than an exchange of communications, in which G. E. stated it was engaged in working on the problem, nothing in the nature of a practicable working device (although G. E. denies this) was produced. The Chesapeake & Ohio Railroad was disappointed and G. E. ceased its endeavors, still insisting that the railroads were not yet receptive.

While the evidence does disclose that the railroads were reluctant to financially underwrite a venture into the production of hot box detectors—this being so because of the many so-called successful solutions proposed and submitted—primarily to the Association of American Railroads, which for various and sundry reasons were found to be impracticable and discarded, yet there were railroads like the Chesapeake & Ohio that were willing and anxious to test equipment that might offer a solution of a costly and aggravating problem. Conferences and communications between G. E. and the Chesapeake & Ohio commenced in April, 1953, and finally terminated with the letter of September 16, 1954 (PX41) wherein G. E. stated to the Chesapeake & Ohio, in substance, that its laboratory had completed its development program and was ready to "produce preproduction samples" and concluding:

"Frankly, the financial backing required for further testing has not been aproved by the company. I have conveyed to them how anxious the railroads are for a device of this type and ask that they do everything possible to proceed with these developments."

This was before Servo became a serious contender in the field of the development of a "hot box detector." Despite the repeated assertions of G. E. to the contrary, at least some of the railroads were, before 1955, seriously and intently interested in any device that could in some practicable manner indicate hot journal boxes on freight cars.

Before taking up the patents, I desire to point out that it is somewhat regrettable, in view of the complexity and volume of the testimony and the great number of exhibits filed, that the presentation of the case as a whole did not follow a more integrated and logical course. In point of time there was no fixed continuity, either as to the presentation of oral testimony or the filing of exhibits. For this, at least in part, the Court and Master were somewhat responsible in their efforts to keep the case moving.

All will agree, however, that each had his full day in court.

The Patents and the State of the Prior Art

The basic patent is the '309, or "Orientation" patent which will be first dealt with. The claim of the inventors is that they were the first to construct an apparatus consisting of certain component parts housed in a sturdy metal box (physical models of both the Servo and G. E. detectors were filed as exhibits) to be mounted trackside, preferably on a metal, concrete or wooden base, in such a manner as not to be affected by the passage of trains, looking upward and inward at such angles (in relation to the rails) so that the apparatus will view only the trailing (lateral) sides of passing journal boxes. Servo claims that it was the first to so construct and mount trackside, below the level of wheel axles, such a device so that its internal components would scan only journal boxes and register their temperature to the exclusion of all other heat sources that would otherwise tend to actuate false signals and that this was accomplished by using or taking advantage of the underside of the cars as a uniform reference background. This manner of mounting and pointing the apparatus is referred to as the "toed-in" method which the inventors say is the crux of their invention.

The body of the detector is composed of a heavy outer metal shell with a partial interior shell which, with its air space, tends to keep down the interior temperature of the box. Housed within the box is a lens, bolometer and an amplifier all electrically connected so that the device when mounted trackside and in operation can receive infrared heat waves from passing journal boxes. The metal shuter, which is the subject of the '857 patent, or "Shutter" patent, and which the inventors claim acts not only as a protection to the delicate internal parts of the detector

but as a reference background when the detector is not scanning, opens when the first wheel of the train passes over a magnetic transducer or wheel trip, whereupon, the device is made ready to receive heat signals from journal boxes as long as the train is in motion and as each successive wheel passes over the wheel trip the shutter stays open until a brief interval after the train's departure, whereupon, it automatically closes.

Hundreds of pages of evidence are devoted to a detailed description of bolometers, lens, shutters, amplifiers and circuitry and the part each and all play in connection with hot box detectors. An almost equal number of pages deal with various types of wheel trips, mechanical, magnetic and electrical, the funtion of which is to open the protective shutter of the detector and while the train is in motion gate through to the recorder the heat signals from passing journal boxes. This gating is generally denominated as *time* gating, where the signal is of a fixed duration, or *space* gating, where the signal is gated through for a time space which is governed by the speed of the train. Space gating is generally accomplished by the use of two wheel trips or transducers.

Both Servo and G. E. use in their equipment the "thermistor bolometer" patented in the 1940's by Bell Telephone Laboratories but marketed by Western Electric, both being affiliates of the American Telephone and Telegraph Company—licenses to use such equipment having been granted to Servo and G. E.

Plaintiff and defendant agree that the thermistor bolometer has aided greatly in the receptive diagnosis of infrared signals from heated metals, especially in the hot journal box field area. Servo is licensed to manufacture thermistor bolometers, which are extremely sensitive to infrared heat waves. These waves are passed on to the bolometer through a lens which is located in a tube or barrel in front of the bolometer. The function of the lens

is to act as a filter so as to pass on to the bolometer only waves of a certain length; the infrared energy waves being in a range from about 2 to 12 microns.

The lens problem was early found to be a most difficult one. Ordinary glass will not permit the passage of infrared energy waves. Various substances were experimented with and Servo came up with an arsenic trisulphide lens which it called "Servofrax lens." This proved to be the most satisfactory type of lens for hot box detection purposes. When the shutter opens, the arsenic trisulphide lens permits the infrared energy waves to pass through to the thermistor bolometer, composed of two elements arranged in a bridge circuit. The active flake only of the bolometer receives the energy from the infrared waves causing it to change its resistance, with respect to the inactive element of the bolometer which, in turn, brings about a differential electrical output from the bridge. The amplifier then amplifies this voltage to a point where sufficient power is generated to make a recording on a tape or sound an alarm.

Amplifiers are either of the D-C (direct current) or A-C (alternating current) type.

It was soon learned that a D-C amplifier would not successfully function in a hot box detector other than possibly a laboratory model. G. E.'s expert, William D. Cockrell, admits this and Warshaw found this out in his 1949 experiments. The A-C amplifier is used by both Servo and G. E.

The A-C amplifier has desirable operating characteristicts in that its gain can be made uniform and it is substantially independent of power supply voltage variations, the smallest changes in which creates a drift problem in a D-C amplifier. When, however, an A-C amplifier is used in an instrument to scan hot journal boxes, it has the disadvantage of becoming saturated and thus fails to pass informative signals for a short period of time after the detector has viewed an extremely hot or cold

source, just prior to viewing the journal box (in this case the target). The experts for both Servo and G. E. agree on this.

Benjamin Cooper, another of G. E.'s experts, testified that an A-C amplifier acted as though it had a memory recording the history of what happened previous to it, whereas, a D-C amplifier does not have a memory. The importance of this is of great significance in the practical application of the use of a thermistor bolometer in a hot box detector. If the bolometer is exposed to any source (other than a passing journal box), such as the sky, snow, reflections from a bright object, or an unfavorable background, from which infrared heat waves emanate, the bolometer will pass the signal through to the amplifier which may thus became satuated and a false signal or recording will result.* Servo claims that its orientation invention solves this most difficult problem by mounting its detector track-side below the level of passing journal boxes, angled upward and inward so that the bolometer, when not receiving heat waves from journal boxes, is focused on the underside of the passing cars, which provide a quiescent background, the ambient temperature remaining the same during the day or night, and throughout all seasons of the year, regardless of the direction of the movement of the train, and that the temperature of which, in relation to the journal boxes, can be accurately determined to the exclusion of other discordant heat sources so as to detect only overheated journal boxes. This Servo claims can be done, even without gating through the signal when otherwise only the journal box is in view. G. E. claims that orienting the detector is perfectly obvious, even to one unskilled in the art, and that this method, at least as to the mounting of the detector track side and angled upward, is disclosed

* As will hereafter appear, G. E.'s electronic expert Cockrell insists the role that the amplifier plays is more important than the manner in which the detector is oriented.

by the prior art. G. E.'s experts and its counsel contend that the secret of successfully viewing overheated journal boxes resides in a combination of a proper filtering lens, a thermistor bolometer and a non saturating amplifier. The record contains no evidence that a non saturating amplifier is as yet available. G. E.'s Cockrell, (whose evidence will be referred to a number of times in this report) who admittedly is the father of G. E.'s hot box device, one of its top electronic engineers, and the publisher of a text book on "Industrial Electronic Control" (later edited as an "Industrial Electronic Handbook") when cross examined on the use of amplifiers, testified as follows: (R-4315-16)

"Q. So this was not important; the viewing angles were not important? A. So far as I am concerned, the viewing angle was not important then; it is not *extremely* (emphasis supplied) important now; except as a crutch for an infrared amplifier. If we had a perfect D-C amplifier, we would not worry at all about angles.

Q. Oh, well, do you have perfect D-C amplifiers today? A. We do not.

Q. Oh, I see. So the use of this equipment so far as orientation and angles is concerned is to some extent limited by the fact that you had an A-C amplifier to work with, only? A. I am afraid that's a fact of life."

Again, (R-4450) when questioned by G. E.'s trial counsel, Cockrell said:

> " . . . and I think the court will appreciate if we had an amplifier which would not saturate, which would not change its calibration over the days and we could then so gate that amplifier that only the signal that came from the bolometer as we were looking at the journal—we would have an excellent output *with very little to bother from the outside influence* (emphasis supplied). Since we cannot

have a perfect amplifier, we make the best we can and then use these various crutches for protection of the bolometer against strong outside light and that type of thing to assist it."

Cockrell characterizes the "toe-in" viewing angle as one of the crutches. While constantly stressing the importance of the role the amplifier plays in the successful scanning of journal boxes, yet he is nevertheless forced to admit its present limitations which necessitates the use of his so-called "crutches."

The thermistor bolometer is patented and used by both Servo and G. E. Servo asserts no inventive claims as to its arsenic trisulphide lens, likewise used by both. The A-C amplifier is an integral part of the equipment of each. None of these elements of the detectors of plaintiff and defendant, together with their electrical circuitry, are directly involved in Servo's invention claims relating to its "orientation" '309 patent, other than they constitute essential components of the detector of each.

The amplified output of the bolometer, which reflects changes in the infrared radiation which falls upon it, is employed by both parites to actuate pens of a recording galvanometer. These recordings are made on a tape. Detectors are mounted, one on either side of the tracks so that the temperature of each end of the axle can be read; thus, there are two lines produced on the paper tape of the recorder. Each line contains a series of pips, the height of the pips above the base line indicating the temperature of passing journal boxes. There are several kinds of recorders. Sanborn recorders are standard equipment for both Servo and G. E. These recorders can be placed near the vicinity of the detectors or may be placed some distance away. In actual operation it is desirable to mount the detector trackside several miles beyond a railroad repair yard and transmit the signal to the

recorder located within the yard. The tape is thus read at a point considerably in advance of the incoming train. An experienced operator can thus determine, from studying the tape, if there are overheated journal boxes on any of the cars. There is no contention on the part of either as to its right to make use of recorders.

Those who sought to solve the hot box journal problem were faced with many perplexing difficulties. Aside from the selection, assembly and housing of the internal components of an apparatus designed to view journal boxes of passing trains, it was also necessary to take into consideration many factors such as: the type of journal bearings, whether friction or roller, the shape of the journal box,* the varying diameter of the wheels, the sway or motion of the train, as well as its speed, the portions of the journal box to be scanned, whether the lid, top, bottom, leading or trailing sides, the heat sources on the train, such as brake shoes, steam hoses, etc., and especially outside disturbing factors, the sun, clouds, snow, reflections and any unfavorable background. Added to all of this is the fact that railroads, of necessity, must make use of rugged and exacting equipment, designed to be utilized in an environment where utility and dependability are essential. While G. E. insists otherwise, there was no real break-through or solution of the problem until Servo's Gallagher and Pelino collaborated.

The Conception

Cornelius A. Gallagher, one of the two inventors in the '309 or "Orientation" patent, was on the stand for the greater part of some six days, during which time he was subjected to an extended and elaborate cross examination. I deem it fair to say that all who heard him were im-

* Journal boxes housing roller bearings are generally smaller, more rounded, and do not protrude as far, measured from the end of the axle, as do friction journal boxes and hence proved more difficult to bring within the view of the scanner.

pressed with his candor and with the forthright manner in which he answered questions without equivocation.

Gallagher (R-2939 et seq.) begins the explanation of his and William M. Pelino's conception of how to view railroad journal boxes so as to eliminate false, unwanted and disturbing signals, as follows:

> ". . . we were sitting down one day and I had the *Car Builders Cyclopedia* in front of me as we were discussing the problem and we were reviewing the failures that my circuit had encountered on not being able to get a *true ambient reference* (emphasis supplied), and we had more or less discarded the shuttering idea as being a mechanical difficulty. We had gone through the possibilities of germanium shutters and then in this—in this discussion, and while we were sitting there it dawned upon one of us that in order to deal with the problem of a train or car in, say, Maine, in a difficult winter condition and a train in Texas where it is warm, you would have to have something that would give you a standard of comparison because heat is a difficult thing to put in a standard condition. We were looking there—I don't know whether it was triggered off by looking at the book, but it occurred to us that the car was always in the environment of the target and subjected to the same conditions, whether it be in winter or summer. We might have gone off on the tangent of thinking how we could use the car as a reference in other manners, as taking radiation from it and developing voltages, and things like that, but then one of us in looking at the *Car Builders* Manual noticed a darkened area under the car. That seemed to be a good place. It is out of the sun and there is no snow there, and we began considering the feasibility of looking at the bottom section of the car, and not putting all

of your heat sources of hot brake shoes and hot wheel rims; and it went rather rapidly from that point on to where we would consider *looking in such a manner as to get at the bottom of the car for this referencing and still sweep the journal and miss the remainder of the hot sources.* (Emphasis supplied).

This alternately was the arrival at the idea of putting it down on the ties and looking up. From that point, I recollect that I marked in the encyclopedia the angle by putting a protractor and drawing a line on it. This constitutes my recollection of how it happened."

This occurred during the latter part of April, 1956. Prior to this, Sabert N. Howell, a Servo engineer, had conducted many experiments, some under the direction of Joseph F. McDonald, also of Servo, who was in charge of the hot box problem, until approximately the end of April, 1956.

McDonald, in March, 1956, before the Gallagher and Pelino conception, and after a great deal of development work, which failed to produce a successful scanner—although Howell did secure certain patents—best summed up the requirements as follows: (PX - 348)

"The hot box detective to be practicable must single out an overheated journal box from all normally heated targets that will come into view *day or night, winter or summer,* on rail lines running *to all points of the compass.*"

The evidence clearly demonstrates that, despite G. E.'s insistence to the contrary, no one prior to the combined undertakings of Gallagher and Pelino had ever come up with a practicable or successful "Hot Box Detector."

Following their conception, Gallagher and Pelino, over the ensuing weeks, proceeded to put into practice their ideas, first on the Long Island Railroad and, a little later, on the New York, New Haven and Hartford. These tests, especially on the New Haven, were made by using a bolometer, Servofrax lens (mounted in an adjustable focusing barrel) and a stock amplifier—Servo was manufacturing amplifiers. The tripod was discarded and shock mounted angle brackets were used to protect the equipment from vibration. The brackets were fastened down on the ties with screws.

Gallagher testified (R - 2949)—

"Q. I see. So the reason of the shock mounts had something to do with the fact that this was a new location; is that correct? A. It is due to the vibration in the environment in which we mounted the unit.

Q. You say this is the first time you mounted it in this environment? A. It's the first time it was ever subjected to the vibration of the ties, and the trains moved very fast.

Q. By 'this environment' you mean on the ties? A. Physically on the ties."

As to the vertical angle first used, Gallagher (R - 2952) testified on direct examination:

"Q. I notice your angle of view, then was about 45 degrees? A. I think that might be a typographical error, because it was 35 degrees, between 30 and 35.

Q. What is it now? A. Well the first time we installed it, installed it to a railroad, it was 35 degrees; and then around March or April, we made the toe-in changes which toed it in 10 degrees, and then we eventually lowered it to 25; so the present orientation is 10 degrees toed in and 25 in the vertical angle.

By the Master:

Q. Now, when you spoke of when you toed it in, you were not talking, then, of 1956? A. No, that's 1957."

From then on, Gallagher, the co-inventor of the "orientation" patent '309, and who also testified at great length, during which he was subjected to a grueling cross-examination, conducted many experiments. It was at Oak Point on the New Haven that they first encountered a problem with roller bearings and noted that large amplitude pulses on roller bearings were occurring—something that up to then, they had never encountered.

On June 25, 1956, the inventors noted their disclosure, and on November 6, 1956, filed their parent patent application which gave rise to a division in part of the patent known as the "Shutter" patent '857, issued May 9, 1961, and a continuation in part application filed June 30, 1958, resulting in the issuance of the "Orientation" '309 patent March 31, 1959.

The "disclosure" (PX 384) sets forth:

> "Shutters are completely eliminated by the plan of figure 2. The pyrometers see only the journal boxes and *the underside of the car overhang which is nearly at ambient temperature.*" (Emphasis supplied).

In experimentations in the hot box field it was early discovered that due to the tendency of the bolometer to pass through to the amplifier false signals (those not emanating from journal boxes) it was necessary to build into the scanner some reference background that the bolometer would be looking at when not viewing journal boxes. Shutters were tried and attempts were made to so synchronize the shutter blades, with reference to passing journal boxes, as not to allow the bolometer to see anything but the back of the turning blades except when a journal box came in view. Due to the varying speeds of trains and the synchronizing problems, shuttering proved impracticable. Servo discovered another way to eliminate this most troublesome of all scanning prob-

lems. The underside of the car Servo found to be under all conditions, winter or summer, day or night, near ambient temperature, thus furnishing a much sought and desirable reference background and, for the first time, so mounted its scanning device as to take full advantage of this discovery.

I find from the evidence before me that Servo made a true break through in the hot journal box detection field and that there is novelty, utility and unobviousness in the discovery. As to utility, there can be no question. The defendant acknowledges this and, more importantly, substantiates it (as will hereafter appear) by manufacturing and selling hot box detectors embodying all the essential features of Servo's detectors. In fact, the vertical and toe-in viewing angles are almost identical. At the time of the trial, both Servo and G. E. had somewhat refined and standardized their products. In August, 1960, Servo had sold or leased some 200 detectors and G. E. approximately 117.

Servo's Progress and Contentions as to Claims 5 and 6 of "Orientation" Patent '309

I consider Servo's Exhibit 360 as being of particular importance, as it shows in graphic form the early Servo Breadboard Model viewing experiments, thence continuing down through its Lot No. 1 model. The various railroads, dates and actual viewing time reduced to hours, are assembled on one sheet. The drawing includes the angles employed, both vertical and acute, giving dates of changes made in angles and including drawings of side and end-on configurations of a flat car, hopper car, gondola, box car and tank car with outlines and dimensions of wheels, and journal boxes, both friction and roller bearing. The approximate percentages of the various types of cars are given as they are normally used in railroad transporta-

tion. This word picture brings into focus some of the difficult problems that beset the would be inventor of a practical and successful hot box detector. It also emphasizes the necessity for experimentation before a final determination could be made as to the establishment of vertical and acute angles of such a character as would eliminate false signals passed to the detector when scanning certain types of railroad cars—more especially unloaded flat cars and tank cars not equipped with catwalks.

In standard practice Servo scans at a vertical angle of 25° and toed-in angle of 10°. G. E. scans at a vertical angle of 26° and an acute angle of 8°. Servo learned that in order to view all types of journal boxes and yet use the underside of the train as a reference background it was necessary to move its detector a little further from the rails and toe it in slightly—this, however, necessitated the lowering of the vertical angle. G. E. learned from Servo (discussed under the head of Infringement) and merely made a slight change in the two angles, producing however, the same result.

G. E. insists that claim 5 of Servo's patent '309 is indefinite and cannot be construed to embrace specific claim 6, which is referred to as the "toe-in claim"; that claim 6 must stand or fall without the support of claim 5, which is not a generic claim, and that Servo had discovered the "toe-in method" and employed it in detectors leased and sold to railroads more than one year prior to June 30, 1958, the filing date of its continuation in part application, based on its original parent patent application filed November 6, 1956. Further, G. E. insists that claim 6 of the "Orientation" '309 patent is barred by virtue of the fact that Servo Publication SB-23 (DX 69) read in conjunction with a letter from Servo to the Virginian Railway Company, dated June 30, 1957, which G. E. claims is typical of similar letters sent to other railroads, described the toed-in form of the invention; and, finally,

G. E. relies on a publication in the Railway Age, dated July 1, 1957, but actually published—G. E. contends—before the date it bore.

I will first examine the status of claim 5 of the "Orientation" '309 patent. I consider this a broad or generic claim. Much space in both the evidence and briefs is devoted to the discussion of the aspects of claim 5 and its relative merits. Mr. Yung Kwai, a former employee of the Patent Office, testified as to the character of claims 5 and 6. Portions of his testimony are quoted in the briefs of Servo and G. E. I first advert to the file wrapper of the Gallagher and Pelino application, Serial No. 620,703 (PX-14) filed November 6, 1956. On page 3, the inventors, in describing their invention, say:

> "Briefly stated, our invention contemplates an improved hot box detector of the variety in which a heat-responsive cell or element is fixedly mounted alongside a section of track to be monitored. Optics continuously image the cell in the plane of passing journal boxes and *on an axis inclined generally upward* from beneath the passing boxes. The vertical plane which includes the viewing axis is *preferably substantially parallel* to the track, so that the viewing of brake shoes, steam hose connections and the like can be avoided * * * As best shown in fig. 2, the viewing axis 16 slopes upward at an acute angle, which is preferably of the order of 20 to 50 degrees from the horizontal, and is aligned to observe the part of the journal box body which projects outwardly of the side frame 20; we have obtained very satisfactory results when the viewing angle is approximately 35 degrees in the vertical plane which parallels the adjacent track 13.
>
> It is to be noted that since the car frame 19 overhangs the journal box 18, *the viewing aspect 16 is*

such as to establish a more or less quiescent background level response of cell 14." (Emphasis supplied).

Claim 1 of the original application states:

"A hot box detecting device, comprising * * *, and optics imaging said heat responsive means along an upwardly inclined axis, and in substantially the plane of passing journal boxes."

Claim 2 states:

"A hot box detector * * *, said axis being substantially in a vertical plane that is parallel to the adjacent track section."

Claim 3 states:

"A hot box detector according to claim 2, in which said upwardly inclined axis is at an angle extending from the horizontal, in the range 20 degrees to 50 degrees."

Claim 4 states:

"A hot box detector according to claim 2, in which said upwardly inclined axis is at an angle of substantially 35 degrees from the horizontal."

As to the vertical angle, both the parent application, as well as the '309 issued patent, specify a viewing angle in the range of 20 to 50 degrees. Both also specify an angle of "substantially 35 degrees." Claim 4 in the application stating "from the horizontal;" Claim 5 in the patent concluding "above the general plane of the rails of said track"—each means the same thing. It is to be noted that 35° is exactly midway in the angle range of from 20 to 50 degrees. As has been pointed out, G. E. uses a ver-

tical angle of 26 degrees. Servo's vertical angle is 25 degrees. Both are within the range of 20 to 50 degrees specified in the parent application and in the patent. When the language "preferably" 35° was inserted in the patent it is plain that Servo did not thereby intend to limit the angle to 35°.

As the so-called "acute angle" is relative to the longitudinal direction of the track, which gave rise to the expression "slant aspect viewing," G. E., in substance, maintains that this change amounts to a new invention and that such was not embodied within the substance of the original claims. With this I do not agree.

Original "Claim 4" did not specify any angle relative to the direction of the track except an upward angle. The inventors, it is true, in describing their invention speak of the vertical plane which includes the viewing axis as "preferably substantially parallel" to the track but this plainly does not mean "parallel" to the track. The Patent Office required the language "generally in the longitudinal direction of the track," or rail, to be inserted in the claims of the issued patent. While admittedly this may be broader language than "substantially parallel", yet it does not materially change the intended meaning of the claims set forth in the original application. As a matter of fact, original Claim 5 was not so limited.

While both parties in their briefs (and especially in their reply briefs) dwell upon this at some length, I am of the opinion that they have, in giving it undue emphasis, overlooked the essential ingredient of the invention. This was the discovery of the fact that using the tools at hand, a device could be made and so oriented as to successfully scan and record only hot journal boxes, to the exclusion of all unwanted and disturbing signals and this could be done by taking advantage of the fact that the underside of the cars provided a uniform reference background.

While still insisting throughout its briefs that filtering lens and amplifiers are the keys to successful scanning—which assertions are not substantiated by the evidence, as no perfect filtering lens has, as yet, been produced, nor has there been manufactured a non saturating amplifier—G. E. (RB-34) grudgingly concedes some measure of success to the use of the underside of the car as a uniform reference background by stating:

> "It is only common sense that any shielding from the sun afforded by the shade of the cars is helpful to some degree, and it is only common sense for the designer to avail himself of it, but as we have just shown, Servo goes much too far in claiming that the underside of the cars serve as a quiescent background . . . * * *.
>
> In this general position, the skewed line of sight has two advantages. One is the geometry of it partially offsets side sway. No point of this was made in the '309 patent, and the desirability of it is obvious. The other advantage is that in so far as the filtering system is inadequate, the skewed angle is needed to get rid of some of the exposure to extraneous sky and sun."

Reluctant as counsel for G. E. may be to accord any merit to the Servo method of scanning, here we have an admission (1) of the fact that the "shade of the cars" (which, of course, constitutes a reference background) is helpful in some degree; and (2) that the "skewed line of sight" is needed to get rid of some of the exposure to extraneous sky and sun. Thus, counsel for G. E. confirms the conclusion reached by its expert William D. Cockell (Page 19 of this report) that while the viewing angle is not *extremely* (emphasis supplied) important, except as a crutch for an infrared amplifier, yet, without the crutch, the successful scanning of hot journal boxes would remain

the unsolved problem that it was prior to the collaboration of Gallagher and Pelino.

The "Orientation" '309 patent has the characteristics of a "pioneer" patent. If it does not rise to the full dignity of such, it certainly constituted a major break through in its field. It received wide acclaim, even while still in its experimental stage.

* * * *

The opening briefs of the parties deal extensively with the prior art but there is no well defined segregation of its treatment. The reply briefs, especially that of counsel for G. E., constitutes largely a rehash of what was said before. A veritable mass of testimony and exhibits were assembled dealing with this phase of the case. Experimentations and partial accomplishments are intertwined with mere suggestions, the origin and extent of which remain in the realm of doubt.

Any discussion of the prior art will involve the obviousness or unobviousness of the patents in suit, especially the "Orientation" '309 patent. In its initial statement of the case, counsel for G. E., in his opening brief, devotes pages 6 through 13 to a series of general statements, the import of which is to the effect that there is nothing to the orientation claims in suit, nor to the gating methods hereinabove described. That to place the detector device down on the tracks and look upward was perfectly obvious. The short answer to this is that of the many experts, versed in the art, who tackled the problem, none solved it prior to Gallagher and Pelino. What, with a backward look, now seems obvious, then, with a forward look, remained elusive. A few even reached the conclusion that the task was almost impossible. The maintenance and signal departments of the railroads, as well as committees appointed by the "Association of American Railroads" (A.A.R.) had received many suggestions and had tested some devices but none afforded a solution.

This, no doubt, accounts in part for the "must be shown" attitude of the railroads and emphasized the necessity of centering attention upon the problem of finding ways to prevent the occurrence of hot journal boxes rather than to detect them. However, as heretofore pointed out, diesel engines replaced steam engines, enabling longer freight trains to be made up and hauled greater distances at faster speeds. This brought the problem of hot journal box detection back into focus, as means had not been found to prevent the occurrence of overheated journal boxes. To stop a freight train of from 150 to 200 cars, in order to manually search for a hot box, was a costly operation. The evidence clearly indicates the railroads were anxious and ready to lease or purchase and experiment with any device that presented what might appear to be a practicable solution.

(a)

"FATTOR"

At the outset of the case G. E. relied, to a considerable extent, on the work by an engineer by the name of A. P. Fattor as prior art anticipatory of Gallagher and Pelino. As the suit progressed, and after the taking of Fattor's deposition, it was urged that the "Servo Slant Aspect View" was obvious and that Fattors' I and II proposals were teaching publications which disclosed the viewing angles of the orientation patent. It is apparent from a close inspection of the text and drawings of "Fattors' electronic hot box detector" (PX 121 and DX 24) that Fattor, who styled himself a chemical engineer, holding a Masters Degree in physics (and a former employee of the Denver, Rio Grande and Western Railroad) was well versed in the use of bolometers, thermocouples and thermopiles and had experimented with them in recording the heat from journal boxes. The record is not clear as to the extent of his knowledge of filtering lenses or amplifiers. He tes-

tified that he conceived the idea of scanning journal boxes in 1945 and actually filed an application for a patent in 1949, which was later abandoned. His application embraced the viewing or scanning features disclosed in what is referred to in the record as "Fattor I." This represents a detector mounted at cross-tie level and pointed directly upward at a 90° angle ostensibly viewing the bottom of a journal box.

Upon submission of his material to the hot box committee of the A.A.R. he was advised (1) that the bottom of a journal box was not the proper place to record the temperature;* (2) that his constructional features were questionable, as the drawing disclosed a mounting fixed directly to the ties; and (3) that before any technical claims as to the speed and efficiency of the bolometer could be verified, a test unit would have to be made and these factors determined. Fattor's I disclosure did not teach, in any respect, the embodiments of Claims 5 and 6 of the "Orientation" '309 patent.

After considering these criticisms, Fattor then submitted to the A.A.R. hot box committee a new proposal (Fattor II) with drawings outlining certain test procedures relative to viewing at an angle so as to scan the trailing side of a journal box. This new proposal, which was based upon ideas not his own, stated:

> "I now propose to set the detector at an angle such that an area of the journal box *extending from its top surface to and including the bottom surface* will be scanned by the detector. This arrangement will provide greater sensitivity to journal

* The bottom of a journal box is concave and holds the oil and saturated oil pads or waste and a journal box could well reach a dangerously high temperature before the detector would record this, viewing only the bottom of the box. Tests on the Pennsylvania Railroad had disclosed that only 5% of the heat from the journal box goes directly down through the oil reservoir and pads, 7% goes to the lid cover, 23% travels up into the top of the journal box cover and 55% goes back through the axle into the wheel.

bearing temperature because of the close proximity of the top of the journal box to the heated bearing. Also such an arrangement permits a longer scanning time of each passing journal box. Figure 3 was prepared to show how infrared radiation of a hot wheel or brake shoe will be excluded from the scanning range of detector, this being made possible by employing a *limiting slit* through which the rays enter the detector. *Figure 1 shows a test set-up that may be used* in the overall evaluation of the detector. In the following pages, a test procedure referred to the test assembly is discussed, each of the effects being discussed separately." (Emphasis supplied).

In both the Servo and G. E. detectors the scan is from the bottom to the top as the train is in motion away from the detector.

In describing his proposed procedure, Fattor suggests mounting the detector "so that it may *be placed at all angles* thereby permitting all areas of the journal box to be scanned." At another place he says: "the detector will be made to scan the journal box both from the position indicated *or from any other angle* to facilitate the accumulation of data for all areas of the journal box." (Emphasis supplied).

As I see it, Fattor's suggested ideas for scanning journal boxes could be characterized as purely "shot gun" ideas. This could not be urged as a teaching anticipatory of the viewing or scanning angles described in Servo's "Orientation" '309 patent. This conclusion cannot be dissipated by merely stating that having suggested the viewing of a railroad journal box from "all" angles there only remained the manual task of carrying this out. Fattor never, at any time, made a detector, nor apparently did he ever attempt to make one. He submitted, from time to time, his ideas to "The Committee on Devel-

opment of Hot Box Alarm Devices" (later changed to "The Committee on Hot Box Alarm Devices") of the A.A.R. and requested this committee not to assist him in conducting experiments with any existing hot box detecting device, but to financially underwrite the construction of a scanner so it could then be experimented with. The committee requested him to submit a working model for testing, and even suggested that if after further study it was the consensus of the committee that the principle had sufficient merit, from a practical and economical standpoint, to warrant development work, it could perhaps be handled as a budget item through the recommendation of the committee. A subcommittee was even appointed to pursue the matter further, should Fattor come up with any working device. Fattor not only failed to follow the suggestion of the committee (which had already told him, in substance, that he did not know where to look in his, Fattor I, disclosure) as to the construction of a working model but also never followed through with an application for a patent embracing the ideas he had incorporated into his Fattor II disclosure.

Upon the taking of his deposition, Fattor was presented with ample opportunity to elaborate upon and explain his ideas relative to scanning journal boxes. This he failed to do. Fattor, (R-1268) in explaining the test drawing sent to the A.A.R., in response to a question as to where he would locate a detector said:

> ". . . I wanted to prove, by means of tests, *which would be the optimum position* for this infrared detector, in order to eliminate all these other means that may bring about failure to the detector. That was the purpose of submitting the drawing, to determine this optimum position of the angle, for example, and this I *knew was very important, to have the hot box scanned in such a position that it give maximum response to the bolometer* or to the

infrared detector, *whatever it may be.*" (Emphasis supplied).

To me this is no teaching that could form the basis upon which one skilled in the art could construct a successful and practicable hot box detector. Furthermore, (R-1269) continuing—when asked whether it was his suggestion that instead of placing it on the ties, it be placed below the ties, he said:

> "A. That was one suggestion I made. Another suggestion I made was to put it off to the side, and, by means of a lens system, to have it eliminate these various things through optics of the device."

When an attempt was made to follow this up, he refused to divulge any information as to how this was to be accomplished. Here Fattor has injected into the picture the idea that if one had a perfect filtering lens, possibly, even with the use of an A-C amplifier, detectors mounted at track level or below could be eliminated and scanning could be successfully accomplished on a horizontal plane. I agree with the conclusion stated in a footnote in defendant's brief (DB-38) that "Fattor was a witness who, on deposition, was reluctant and unsatisfactory from the view point of both sides."

The evidence is not clear as to whether there was in fact any publication, within the meaning of the statute, of Fattor's disclosures to the A.A.R. Certainly this is true as to his second disclosure. The defendant has not, in this respect, borne the burden cast upon it. It is, however, on the other hand, almost a certainty that no one connected with Servo ever heard of Fattor and the disclosure of his ideas prior to the actual filing by Gallagher and Pelino, on June 30, 1958, of their application (as a continuation in part of the application for the parent patent) on which the "Orientation" '309 patent issued. In fact,

there is no evidence that G. E. or any other would-be inventor of a hot box detector was aware of the existence of Fattor.

Canada, Warshaw, Orthuber, Johanson, Howell, Willey and Others, as Prior Art

Following Fattor, many instances of prior art are stressed by G. E. In the briefs the discussions of this prior art are not well coordinated. It will not be my purpose to comment upon each separate work or undertaking, nor necessarily to treat with them in any logical sequence as to point of time. In many instances there is an overlapping.

The British Thompson-Houston Company (B.T.H.), an English affiliate of G. E., engaged in some experimental hot box detection work in 1950-51. This work was primarily confined to testing an infrared detector, mounted track side, in a subway tunnel. The viewing angle appears to have been directed 30° toward the rear of the train and 20° downward. While commercially it was never adopted, yet it is significant that G. E., before beginning its experimental work, had the advantage of the B.T.H. findings and reports.

G. E.'s Alfred H. Canada, an acknowledged specialist in the infrared and bolometer fields, collaborated with Howard Warshaw in undertaking to develop a practical hot box scanner. Their work extended over a period of several years and culminated in the granting of a patent to Warshaw, issued October 14, 1958, on an application filed December 30, 1954. When a consideration of the construction of a detector was under discussion it was called by Canada "a pioneer development" undertaking. Both Canada and Warshaw, although they had the data collected by their English affiliate B.T.H., had the use of

thermistor bolometers, had journal box temperatures supplied by the Pennsylvania Railroad and others and had the use of filters, never succeeded in solving the problem.

Warshaw's two reports—the first filed in January and the second in June, of 1954—reflect the progress made and the difficulties encountered. The scanning view employed initially by Warshaw was trackside, pedestal mounted, viewing the top of the journal box at a downward angle of approximately 12°. This proved to be unsatisfactory due to variations in truck-frames and box covers. Also the body structure of "gondola" cars made it almost impossible to employ this method; consequently, the viewing angle was changed so as to view passing journal boxes at a 45° angle to the rail. The scan path, which is shown in Figure 6, page 53 of plaintiff's brief, passes across the top of the lid near its hinge point thence across the top of the trailing side of the journal box. The Warshaw scan path is not at all similar or to be compared with Servo's. Warshaw never made any claim to a reference background. In fact, due to the variations in wheel diameters, and sizes and configurations of journal boxes, the Warshaw scan path is not as practical or desirable as is Servo's. Suffice it to say that although G. E. owns the Warshaw patent, it does not make use of its features, nor has it ever done so on a commercial basis. Canada fully recognized the problems to be overcome or circumvented and he summed it all up in a sentence—

> ". . . we were aiming at simply a device that, without tripping at particular times could operate on trackside twenty-four hours a day, turned on *and only see hot journal boxes go by.*" (Emphasis supplied).

Neither he nor Warshaw achieved success, although it is readily conceded that each was certainly an expert in the hot journal box field.

Actually, before Canada and Warshaw had ceased their efforts to construct a practical scanner, G. E. had what it called a Better Business Management Training group (B.B.M.) also trying to solve the riddle. The accomplishments of this study group added nothing by way of a solution. It was the same old thing—we can scan a hot box but we are unable to scan out extraneous heat sources. G. E. insists its Warshaw work and B.B.M. findings were successful but that the "economic squeeze" was the reason why commercial devices were not constructed. Aside from the fact that G. E. should be one of the last to place its self in the position of the "impecunious Fattor", as counself has described the gentleman, the evidence refutes the claim that the railroads were not vitally interested in hot box detection equipment and ready to test it. G. E. cannot urge this as either a reason why it ceased temporarily its efforts to develop a successful scanner or failed to appropriate money for what it claims would have turned out to be a commercial device. The urgent requests from the C. & O. Railroad for even test equipment, to which I have heretofore called attention, completely nullifies such an assertion. G. E. is correct in insisting that it had then, and has now, the engineering and technical know how and financial ability to tackle almost any electronic problem and in the vast majority of cases, no doubt, solve it, but success did not reward the efforts of its personnel. The obvious was unobvious to G. E. Should there be any doubt as to whether the Warshaw, or B.B.M. product for that matter, would have turned out to be a commercial success, G. E.'s expert Cockrell in his direct examination, after he had already given a rather involved and inconclusive answer to a question as to why he did not consider building a detector designed substantially like the Warshaw or B.B.M. product, said: (R-4366)

"Q. This then would not be a commercial device that you would offer to a railroad or something of that sort; is that correct? A. That is correct."

On October 14, 1958, there was granted a patent to the International Telephone and Telegraph Company on an application dated January 25, 1954. This is known as the "Orthuber" patent and variously referred to as "Farnsworth", "Federal Telephone and Radio" (FTR) or "I. T. & T." due to their connection with the patent. The detector was mounted on a pedestal, journal box height, and scanned at a 90° angle on a horizontal plane. It employed a mechanical shutter as a background for each journal reading.

G. E. holds a license under this patent and insists that it incorporates gating of the same type employed by G. E.—a gating actuated by a variable reluctance pick up. This is denied by Servo. Granted, however, that this is one of the kinds of gating covered by the Servo "Orientation" '309 patent, nevertheless, Servo only asserts the protection of its claim, in this respect, when this form of gating is used in connection with the Servo's slant aspect viewing.

An Orthuber detctor was tried out on the Erie Railroad during the last two months of 1956 and in January 1957. It broke down and failed to function on numerous occasions and was finally removed. G. E. claims it could have been a success but, if so, the proof of this assertion is entirely lacking. The Orthuber or Farnsworth device used a shutter as an internal reference background. Shutters have been tried many times but in the whole range of evidence there is no recorded instance where a mechanical shutter proved satisfactory. In this method of operation there is no similarity between Servo and Orthuber. F. Youngwerth, General Superintendent of Communications and Signals of the Erie Railroad, in a letter to G. C. White, Vice President of Operation and Maintenance, Erie, in September 1958, in commenting upon the information he had received from other railroads as to the excellent results they had experienced in using Servo detectors, made the following comparison: (PX-216)

> "This to say the least, is remarkable when compared with results we experienced with Federal Telephone & Radio Corpn. detector. (Orthuber or Farnsworth) at North Judson."

The United States "Johanson" patent issued December 31, 1957, on an application filed January 26, 1955, and the German "Johannson" patent published March 29, 1956, are cited as prior art. Neither of these patents teach an external reference background or an orientation method of viewing journal boxes. The United States Johanson patent views journal box lids on a horizontal plane. The German Johannson patent discloses a detector mounted between the rails, inclined vertically upward, viewing car axles. Each make of a detector uses an internal reference background of the nature of a chopper blade.

Finally, G. E. relies on the early experimental work of Servo (before the teaming of Gallagher and Pelino) as prior art teaching, beginning with Howell, Dergano and Willey, and extending down to March 1, 1956, when Pelino became associated with Servo. It seems strange that G. E., in its briefs, stresses its contention that it had pioneered in a search for a method to detect overheated journal boxes, whereas, Servo entered the field a number of years later when the railroads were becoming more receptive to new ideas and new equipment yet, at the same time insisting that the early exertions on the part of Servo personnel actually brought the search for a solution down to the point that constituted a teaching which was merely followed or carried out by Gallagher and Pelino. As to Servo, I do not find either contention to be in accordance with the evidence.

Defendant, in its brief (DB-80) points out that in December, 1952, as a result of Servo's advertisement of infrared measuring equipment, an inquiry was received by Servo

from the Baltimore & Ohio Railroad. In April, 1953, (G. E. continues) as a result of "some preliminary thinking" on the part of Howell, Derganc and Willey, Servo made application for a patent which G. E. adds was never issued, although it included the Gallagher-Pelino basic essentials of an infrared detector. This reasoning is unclear, for the purpose stated; however, it does prove (1) that in 1952 the B. & O. Railroad was interested in a hot box detector device and (2) that Servo, which also possessed considerable knowledge as to the possibilities of infrared, thermistor bolometers and viewing lenses, was very much engrossed in the problem.

In October, 1953, R. J. Berti, Assistant Electrical Engineer for the Union Pacific Railroad, also contacted Servo, as did the Southern, shortly thereafter. The Hycon Manufacturing Co. was also contacted by T. L. Carlson, General Superintendent of Signaling and Communications of the C. & O. Railroad Company, (and an important witness in the case) in October, 1955, in regard to the availability of a hot box detector. I cite this further instance not because Hycon Manufacturing Co. ever developed any device worthwhile (it was just another company trying to develop a successful scanning device) but to emphasize again the fact that the railroads were turning to every source that appeared to offer a solution.

The Norfolk & Western Railway was another interested road. That G. E. abandoned the field in 1955 and did not reenter it until March or April, 1958, after Servo was in the process of demonstrating that it had produced a product of real merit, was not because the railroads were not receptive but because G. E. had failed in its efforts to make a practicable railroad hot journal box scanning device.

Servo's search for a solution to this vexing railroad problem continued down through various experiments and proposals made to the B. & O. Railroad, the Union Pacific Railroad and to the Association of American Rail-

roads, culminating in Sabert N. Howell's (a Servo engineer) patent No. 2,829,267 on an application filed June 14, 1955, and the Willey patent No. 2,970,210 on an application of June 27, 1955. Neither of these prior patents teach the principles, or embodiments of the "Orientation" '309 patent. Both were pedestal mounted detectors, their viewing planes being horizontal to the track and directed to the lid of passing journal boxes.

It is urged that the Howell patent disclosed the features of the "Shutter" patent, (yet to be discussed) but in passing, it should be noted that the shutter in this patent was located between the lens and the detecting bolometer, and not in front of the lens.

Neither of these patents even remotely teach the slant view aspect viewing of the "Orientation" '309 patent.

* * * *

I find nothing in the prior art cited that would constitute a sufficient teaching to enable one skilled in the art, to construct a hot journal box detector embodying the features and claims of the "Orientation" '309 patent. With the exception of Fattor, the Patent Office had the benefit of and examined practically all of the prior art of any consequence. Burnham Yung Kwai, who for forty-one years had been on the examing staff of the United States Patent Office, in answer to a question with regard to how extensive a search had been made as to the '309 patent, stated: (R-3962)

*"A. Well, the examiner in these cases made searches in 13 classes and interviewed examiners in other divisions. He cited in this particular case 19 references. He had the benefit of the attorney's search in the petition to make special. Consequently, he covered the railway signal art, he covered the radiation art, he covered electrical circuit, measuring and testing, and other things. So he

* The witness estimated that he had spent (R-3932) about six days examining the file wrappers.

made a rather extensive search and had quite a few more than the normal number of references before him."

The "Orientation" '309 patent did not just sail through the Patent Office in a routine manner, as intimated by G. E. In the words of Yung Kwai, the patent had a rather rough time, as is disclosed by an examination of the file wrapper (PX 11 (a)).

On cross examination as to why the claims were first rejected and then allowed, Yung Kwai testified: (R-4028)

"Q. Can you tell me why he first rejected them and then later allowed them.

A. That is normal procedure. The examiner rejects the claim if he thinks it is unpatentable over the art he has. He then gets a reply from the attorney and if from the attorney's reply, or if from his own study of the disclosure, he finds that the claim indicates novelty, utility and something that is unobvious to a man ordinarily skilled in the art at the time the application was filed, he should have allowed the claim. That is what he is taught and that is what he does."

Now to put it in other words, the examiner in this case found novelty in the claim because he did not have a single reference to meet. He found it useful and he said that early.

In order to have the third requisite of patentability, unobviousness to a man skilled in the art, the yardstick used is if the novelty and the claim produces an improved new and unexpected result or some advantage, then the claim is allowed.

Now he, using that process, found out from the attorney's office and from his study of the specification that there was a useful and new result here, so he abandoned his references and allowed the claim."

The "Orientation" '309 patent stands aloof unanticipated by the prior art. It measures up to the tests that are

given expression to in *S. H. Kress & Co.* v. *Aghnides*, 246 F. 2d 718 (C.A. 4, 1957); *Honolulu Oil Corp.* v. *Shelby Poultry Co.*, 293 F. 2d 127 (C.A. 4, 1961); and *Diamond Rubber Co.* v. *Consolidated Rubber Tire Co.*, 220 U.S. 428 (1911).

The defendant further has failed to rebut the presumption of validity that flows from the action of the Patent Office in granting the patent after a consideration of numerous prior patents: *Chesapeake & Ohio Ry.* v. *Kaltenbach*, 95 Fed. 2d 801 (C.A. 4, 1938); *Manville Boiler Co., Inc.* v. *Columbia Boiler Co., Inc.*, 269 Fed. 2d 600 (C.A. 4, 1959) and *Power Curbers, Inc.* v. *E. D. Etnyre & Co.*, 132 U.S. P.Q. 158, (C.A. 4, 1962).

* * * *

CONCLUSION

For the reasons hereinbefore set forth, I recommend that judgment be entered containing the following provisions:

1. United States Patent No. 2,880,309, herein referred to as the "Orientation" '309 patent, is valid as to the claims in suit numbered 5, 6, 9, 10 and 11.

2. United States Reissue Patent No. 24,983, herein referred to as the 'Shutter" '857 patent, is invalid.

3. United States Patent No. 2,963,575, herein referred to as the "Alarm" patent, is valid as to claims in suit numbered 3, 4, 5 and 20.

4. The manufacture, use, sale and installation of tie-mounted detectors, by the General Electric Company, infringes the above identified claims in U. S. Patents No. 2,880,309, and specifically the sale to

the Erie Railroad of a tie-mounted detector, without G. E.'s peak reading, infringes claims in U. S. Patent No. 2,880,309 and Claim 20 in U. S. Patent No. 2,963,575 and the sales to the Texas and New Orleans and the Southern Pacific infringe the claims in both patents.

5. Defendant, General Electric Company, has competed unfairly with Servo and has been unjustly enriched by gaining access to and utilizing portions of Servo's detailed engineering data in the construction of General Electric Company's tie-mounted detectors, wherefore, Servo is entitled to an accounting for the value of such data.

6. Defendant, General Electric Company, be enjoined from further acts of infringement.

7. Defendant's counterclaims for a declaratory judgment of invalidity and non-infringement of patents in suit be dismissed as to United States Patents Nos. 2,880,309 and 2,963,575.

8. An accounting for damages be had but the determination of increased compensatory damages and attorneys' fees be postponed until the time of the accounting, to be resolved by the court.

Respectfully submitted:

R. S. KIME,
Special Master

October 17, 1962

Constitutional and Statutory Provisions

Constitution—Art. I, Sec. 8, Clause 8—

> "To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."

Patent Act of 1952—35 U.S.C. Sec. 103—

> "Conditions for patentability; non-obvious subject matter.
>
> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

Federal Rules of Civil Procedure, Rule 52(a)—

> "Findings of the Court.
>
> (a) Effect. In all actions tried upon the facts without a jury or with an advisory jury, the court shall find the facts specially and state separately its conclusions of law thereon and direct the entry of the appropriate judgment; and in granting or refusing interlocutory injunctions the court shall similarly set forth the findings of fact and conclusions of law which constitute the grounds of its action. Requests for findings are not necessary for purposes of review. Findings of fact shall not be set aside unless clearly

erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses. The findings of a master, to the extent that the court adopts them, shall be considered as the findings of the court. If an opinion or memorandum of decision is filed, it will be sufficient if the findings of fact and conclusions of law appear therein. Findings of fact and conclusions of law are unnecessary on decisions of motions under Rules 12 or 56 or any other motion except as provided in Rule 41(b).

Servo Corp.'s Petition for Rehearing*

The Gravamen of the Petition

The position upon which this petition is based is:

That this Court predicated its application of the standard of invention upon the rationalization that the "answer is not contingent upon resolving conflicting testimony as basic facts are not seriously in dispute". Yet the recital of facts by this Court of Appeals is directly contrary to the specific findings made by the triers of fact below with respect to the objective criteria followed in testing the claims of a patent against the requirements set forth in the statute relating to non-obvious subject matter, namely, (a) the existence of a problem and a need for solution, (b) how many skilled workers unsuccesfully attempted to find an answer, (c) despite the availability of the means for solution in the surrounding arts, and (d) the recognition of the invention of the patent by the industry as an answer to the problem.

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* Servo Corp.'s Petition for Rehearing is printed in full in pp. 90-142 of Vol. XIII of the certified transcript of record and pertinent portions thereof are reprinted in this Appendix for the convenience of the Court.

This Court, before it applies a rule of law to a set of facts different from the set of facts found by the trial court and the master, must specifically find by its own analysis of the record, that such findings were "clearly erroneous". Based upon our knowledge of this record we believe this presents an impossible challenge for this Court of Appeals, and one which its opinion of September 30, 1964 reflects it accordingly did not undertake to accept.

Instead, this Court in applying the standard of invention set forth in Sec. 103 improperly did so in a subjective and independent manner directly contrary to (a) the facts as found by the District Court? (b) the facts as found by the Master and confirmed by the District Court and (c) the facts as they overwhelmingly exist in the record, all of which very plainly established the existence of these objective criteria in this case.

Accordingly, if this Court reached the same conclusion of obviousness by applying the test of invention to the facts as they were found below and as they can be demonstrated to have overwhelmingly existed in the record, this decision would be directly contrary to the widely understood principles underlying the rationale of decision heretofore established over a long period of time in this Circuit in cases such as *Lever Bros Co.* v. *Proctor & Gamble Mfg. Co.*, 139 F. 2d 633, (C.A. 4, 1943); *Florence Mayo Nuway Co.* v. *Hardy*, 168 F. 2d 778 (C.A. 4, 1948); *Colgate-Palmolive Co.* v. *Carter Products*, 230 F. 2d 855 (C.A. 4, 1956); *S. H. Kress & Co.* v. *Agnides*, 246 F. 2d 718 (C.A. 4, 1957); *Otto* v. *Koppers Company*, 246 F. 2d 505 (C.A. 2, 1960); *Manville Boiler Co.* v. *Columbia Boiler Co.*, 269 F. 2d 600 (C.A. 4, 1959); *Honolulu Oil Corp.* v. *Shelby Poultry Co.*, 293 F. 2d 127 (C.A. 4, 1961); and *Entron* v. *Jerrold Electronics Corporation*, 275 F. 2d 670 (C.A. 4, 1961). The District Court and the master specifically relied upon these cases and thus applied the proper rule

of law with respect to invention *but* they applied it to a different set of facts, facts which they, as the triers of fact found.

In substance, the plaintiff-appellee believes that the manner in which the judicial determination by this Court was made and the *modus* of judicial analysis reflected therein, mistakenly led to an incorrect and severly unjust result. The plaintiff-appellee itself would agree with the application of the rule of law embodying the standard of invention *to the facts as they were stated by the Court.* However, when this Court sets forth facts which, in significant respects, do not appear of record, are technologically incorrect, are directly contrary to the findings of fact of the District Court and the master, and to some extent reflect the acceptance of unsupported assertions contained in the appellant's brief, it departs from the proper rule of decision heretofore set forth by the Fourth Circuit Court of Appeals and commits substantial error as a court of review.

This Court, relying upon *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.,* 340 U.S. 147 (1950), stated that it:

> "• • • simply hold[s] that the standard of invention as applied by the Master and the District Court is not up to the legal standard required by the governing statute, 35 U.S.C.A. §103."

There is, and can be, no quarrel with the application of the statute to the facts as they were recited by the Court of Appeals. However, what the Court has misapprehended is that it has not applied the legal standard to the facts of record or the facts as found by the master and the District Court. Nor has the Court determined these facts to be clearly erroneous, a necessary condition precedent, as a matter of law, to the Court's determination.

• • • •

The Existence of the Problem and Need for Solution

This Court stated: *"Nor do we think Servo's argument that the railroads had long sought a solution to the problem will bear analysis."* • • •

The master, on the other hand, found: *"The railroads have long been faced with two problems relative to hot boxes—one to prevent them—the other to detect them—before damage is done.*[3] • • • *The problem of detection remained foremost."*[4] Again, with respect to detection the master found: "• • • *There were railroads like the Chesapeake & Ohio that were willing and anxious to test equipment that might offer a solution of a costly and aggravating problem."*[5] The master also found: *"the record amply discloses, G.E. had been urged by the Chesapeake & Ohio Railway Company to furnish it the necessary equipment*[6] • • •. Despite the repeated assertions *of G.E. to the contrary at least some of the railroads were, before 1955, seriously and intently interested in any device that could in some practicable manner indicate hot journal boxes on freight cars."*[7]

The District Court, which saw and heard witnesses on this subject, found, contrary to this Court: *"Consequently on all sides and for generations there has been a continuing search by the railways and others interested in finding a way by which the overheated journal boxes could be detected before appreciable harm was done."*[8]

Exempletive of some of the record evidence supporting such findings is the following. The witness, Peronto, Secretary of the Association of American Railroads stated: *"Well, the matter of detecting hot-boxes has always been a problem for the railroads in times past."*[9] The defendant's own expert, Alfred Canada, said: *"All railroads*

[3 etc. The record references in support of the Petition as indicated by numerals are identified at pp. A -A , *infra*, of this appendix.]

are faced with the problem of detecting hot boxes on rolling stock, in particular, the Chesapeake & Ohio Railroad Company is interested in obtaining equipment for this purpose. Also, the PRR and NYC Companies have indicated considerable interest in such equipment."[10] The unpublished and not reduced to practice prior art reference relied upon by the Court for another purpose, Fattor, states in 1949, six years before the conception of the invention in suit: *"The problem of finding ways to detect the presence of hot boxes on railway cars and advising the engineer of their presence has been recognized for many years."*[11] Again, a letter from the defendant itself to the Chesapeake & Ohio Railroad, advising of G.E.'s abandonment of research on a hot-box detector states that the writer had advised the G.E. laboratory in 1954 of the demand for a *detector,* two years before plaintiff's invention: *"I have conveyed to them how anxious the railroads are for a device of this type* * * *."*[12]

* * * *

The Unsuccessful Search for a Solution by Those Skilled in the Art and Their Failure to Perceive What This Court Subjectively Holds to Be Obvious

Perhaps the most perplexing aspect of this Court's decision is its statements that *"what Servo had done here is to ascertain the optimum conditions for use of the hot-box detector"*[21] and that this *"objective was discoverable by experiment."*[22] The Court then stated: *"Thus the act of Servo in taking one of the known positions disclosed by the prior art and moving the device outwardly from the rails so as to accommodate the geometry of the truck frames of railroad cars was not invention, this modification was an ordinary engineering matter obvious to one skilled in the art."*[23] The perplexity arises when one considers the Court's statement on unfair competition: *"It is also clear*

from the record that General Electric ceased its activities in the hot box detector field near the close of the year 1955. At that time its experimental department reported the infrared detection of hot journal boxes feasible but involving some difficult problems in practical application."[24] * * * *"General Electric learned that which it needed to know through Southern and both parties knew that their concerted activities were in violation of the confidence reposed in Southern by Servo."*[25]

These statements logically present the question, if the G.E. Company had engaged in a period of experiment; concluded that there were "difficult problems" involved; abandoned its activities; and then, later, learned what it "needed to know" from a physical inspection of the orientation of the Servo device, how can this Court but entertain some doubt about the validity of its subjective finding on the question of invention, namely, that the "objective was discoverable by experiment" and that it was "an ordinary engineering matter"?

A careful reading of the opinion of the Court of Appeals reveals that it did not at all discuss this second criteria. There is no reference to whether there was a search for a solution to the problem of hot box detection and no reference to whether such search did or did not produce a successful solution. A fair reading of the opinion of the Court of Appeals leads to the conclusion that it assumed that there were actually operative prior art devices as a basis for its findings that the invention was simply a minor improvement.

For example, the Court found: *"Though the patent in question is entitled a hot box detector, it correctly acknowledges the earlier development* by others of infrared heat-*

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* This statement is in fact the fulcrum upon which the Court of Appeals lends reality and significance to the prior art. Yet, we think that this Court, upon further reflection, will agree that this statement is plainly incorrect. The patent application very discretely refers to hot-box detectors earlier "disclosed". This obvi-

sensitive apparatus capable of sensing the temperature of moving objects, including the journal boxes of railroad cars."[26] The Court of Appeals also found that the invention of the patent "*merely performed the same function [as the prior art] more efficiently*".[27]

The master however, distinctly found that: "* * * *of the many experts, versed in the art, who tackled the problem, none solved it prior to*"[28] the invention of the patent in suit. He specifically found: "*A few even reached the conclusion that the task was almost impossible*".[29]

The master found with respect to the Fattor disclosure, relied upon by this Court as prior art sufficiently substantial to make obvious the invention of the patent in suit, that: "* * * *Fattor's suggested ideas for scanning journal boxes could be characterized purely as 'shotgun' ideas.* * * * *This conclusion cannot be dissipated by merely stating that having suggested the viewing of a railroad journal box from 'all' angles, there only remained the manual task*

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ously refers to printed or published matter. It does not, and cannot, by any show of reason, be interpreted to mean "developed" or operable devices. There is absolutely no justification for construing the language of the application to constitute an acknowledgment or admission of earlier "development" of any infrared hot-box detector on the basis of the language "disclosed". The plain fact is that the quoted statement above in the text is a word-for-word reproduction of argument contained in defendant's brief at page 3 thereof. We opine that this is hardly a basis for breathing life into abandoned, inoperable, and unsuccessful devices and treating them, in measuring the invention in suit, as though they were not, as the record really shows, residents of a "boneyard of failures and abandoned experiments". This Court had before it the record in this case and it cannot do otherwise but acknowledge as the triers of fact below found, not by inference, but by reliance on all the testimony, that not one of the prior art devices was ever commercially adopted or even shown to have successfully detected a hot-box in regular railroad operation. The entire collection of prior art in this case is plainly subject to the wise and practical observation made by a great judge of this circuit, Judge Parker, when he stated: "Patents for useful inventions ought not be invalidated and held for naught because of such excursions into the boneyard of failures and abandoned experiments." *Reynolds et al.* v. *Whitin Mach. Works*, 167 F.2d 78, 84 (C.A. 4, 1948) cert. den. 334 U.S. 884.

of carrying this out. Fattor never, at any time, made a detector nor apparently did he ever attempt to make one."[30]

The next relevant prior art work involves that of the defendant, the General Electric Company itself. A British associate of G.E. tested an infrared detector utilizing a heat-sensitive element in 1950-51. The master found: "• • • *Commercially, it was never adopted."*[31] The next work was that of two scientists at G.E., Canada and Warshaw. The master specifically found as a fact: "• • • *although they had the data collected by their English affiliate B.T.H., had the use of thermistor bolometers, had journal box temperatures supplied by the Pennsylvania Railroad and others and had the use of filters, never succeeded in solving the problem"*,[32] and that: *"Neither he [Canada] nor Warshaw achieved success, although it is readily conceded that each was certainly an expert in the hot journal box field."*[33] He quoted with respect to the result of this prior work, from the testimony of G.E.'s expert as follows: *"Q. This then would not be a commercial device that you would offer to a railroad or something of that sort; is that correct? A. That is correct."*[34]

The next relevant work was that of another large technically competent company, the International Telephone and Telegraph Company. The master specifically found with respect to this device, which is the prior art reference in evidence known as Orthuber, that: *"An Orthuber detector was tried out on the Erie Railroad during the last two months of 1956 and in January 1957. It broke down and failed to function on numerous occasions and was finally removed."*[35]

The District Court specifically confirmed these findings of the master and found: "• • • *it is the Court's view, as it was the Special Master's, that Servo was the first to conceive and put into successful operation the detector located at a viewing point that would achieve the desired*

result."[36] And the Court further significantly found: *"The best answer to G.E.'s defense of obviousness is the cold fact that notwithstanding the great need for a successful hot box detector by the railway industry and notwithstanding the constant quest for a solution to the problem, it was not until Servo located the proper viewing position that the device became a practical answer. The problem of locating the detector at a point which would view the most favorable spot of the journal box on a moving car under changing conditions, taking into consideration other factors of heat, light and atmosphere obtaining, was a difficult problem to solve, and as before stated, Servo was the first to come up with a working answer."*[37]

* * * *

Availability of the Means for Solution in the Surrounding Arts

This Court found that: "* * * *the possible solution did not exist until the pyrometer was developed in the 1950's.*[68] The Court also found: "* * * *thermistor bolometers were made available in about 1950".*[69] These findings led this Court to conclude that the necessary means for *"The possible solution"*[70] were not available in the surrounding arts and hence this third objective criteria does not exist in this case as evidence of invention.

This finding is, again contrary to that of the master who found:

> "* * * the discovery of the fact that using the tools at hand, a device could be made and so oriented as to successfully scan and record only hot journal boxes, to the exclusion of all unwanted and disturbing signals, and this could be done by taking advantage of the fact that the underside of the cars provided a uniform reference background."[71]

The District Court also recognized the existence of the individual elements and their availability to one skilled in the art, stating: *"The ingredients of the detector were obvious to one skilled in the art".*[72]

The record on this subject is, once again, directly contrary to the findings made by the Court of Appeals and it substantially supports the findings of the master and the District Court.

The record shows that the thermistor bolometer heat-sensing device was known to workers in the infrared field, and specifically to G.E.'s expert Canada,[73] as far back as 1946.[74]

The Warshaw Report reveals that he and Canada at G.E. worked with these very materials in their *unsuccessful* development efforts in 1952-1954.[75]

The Orthuber patent, which was filed in 1954 referred to the use of a "bolometer"[76]. The abandoned I.T.T. Orthuber detector that was tested on the Erie and the Rock Island railroads in 1955 described in a letter written by an Erie R.R. engineer as using a *"thermistor bolometer".*[77] that he was working with infrared sensitive *"bolometers".*[78]

Finally, reference to the work of Fattor in 1949 reveals that he was working with infrared sensitive *"bolometers".*[78]

The temperature data for journal boxes, an element in the art which this Court found could lead to an obvious ascertainment of the proper placement of a detector for discerning the optimum target area, was available in several well known public reports commencing as far back as 1940, ten years before the conception of the invention of the patent in suit.

This Court itself found availability of this data in the art, stating: "* * * *the railroads had conducted a great deal of experiment and knew the relative temperatures of the various surfaces of the journal box".*[79]

Further, the evidence establishes that the General Electric Company specifically had available to it at the time of its work back in 1953 and 1954 *"journal box character-*

istics and temperature surveys" made by the Association of American Railroads;[80] that there was available journal box temperature data from the Railway Service and Supply Corporation;[81] that similar information as to time and temperature was made available by the Pennsylvania Railroad; that G.E., and all other workers in the field, also had available a comprehensive report on the temperature patterns of journal boxes made by Armour Research Foundation in 1954;[82] there was also publicly available an American Society of Mechanical Engineers Report entitled *"Temperature Distribution and Sources in a Conventional Railway Journal Box"*[83], dated October 1940, which contained specific information with respect to the temperature patterns of a journal box.

This Court's finding that a: *"possible solution did not exist until the pyrometer was developed in the 1950's"*, is plainly not the fact and must be based upon some misunderstanding of the record evidence. We can find no such contention in the G.E. brief. In any event, the record is replete with references to infrared pyrometers as far back as 1933.[84]

For example, G.E. relied upon a publication disclosing an infrared chopper type pyrometer for measuring heat of objects in a production line assembly, entitled *"Industrial High Speed Infrared Pyrometer"* published in "Electronics" in 1949.[85]

The Vayada patent, No. 1,901,209, also relied upon by G.E., issued March 14, 1933, *about 23 years* before the conception of the invention of the patent in suit, shows an infrared pyrometer for measuring the heat of hot steel billets in a moving production line.[86]

A G.E. publication, also relied upon by defendant as prior art and entitled "The Photoelectric Pyrometer" shows a photoelectric "pyrometer" for monitoring the heat of moving steel billets and other production items.[87] This

publication is dated November 1936, *some 20 years* before the conception of the invention of the patent in suit.

* * * *

Industry Recognition of the '309 Invention as an Answer to the Problem

We appreciate this Court's reference to "commercial success" and agree with its statement that "commercial success" alone will not turn obvious subject matter into invention. However, plaintiff-appellee never relied on "commercial success" alone.

What plaintiff-appellee did rely upon was the existence of facts which overwhelmingly established the fourth objective criteria of invention as denied by Judge Haynsworth in the *Allen* case, namely: "* * * *recognition by the industry that the claimed invention was the answer, and its prompt adoption with attendant commercial success.*"

The findings of this Court do not deal with the factual record with respect to the "recognition" of the claimed invention as "an answer to the problem". However this Court did recognize that "* * * *the commercial success enjoyed by Servo's detector leaves no doubt that it has produced a useful device* * * *".[88]

The master specifically found "recognition" within this criteria. He found: *"The 'Orientation' 309 patent has the characteristics of a 'pioneer' patent. If it does not rise to the full dignity of such, it certainly constituted a major breakthrough in its field. It received wide acclaim, even while still in its experimental stage".*[89]

The District Court found that other criteria and *"the recognition of the invention as an answer* * * * *all add up to the fact that it was not an invention of ordinary skill in the art".*[90]

These findings have not been found to be clearly errone-

ous and when considered in the light of this Court's own finding that the claimed invention *"enjoyed commercial success"* it would seem axiomatic that the fourth objective criteria within the rule of the cases in this circuit, exists in this case.

Certainly the record overwhelmingly establishes "recognition" and "adoption" in a very realistic and practical sense.

In the light of the failure of any of the prior workers to develop a hot box detector that was acceptable to the railroads and the fact that the record does not evidence the detection of an actual hot box under regular operating conditions by any of the prior art devices, the recognition that the claimed invention provided an answer appears to plainly reside in evidence such as that of Ruff, of the Southern Railway stating: *"This is the first definite indication I have had that it is possible to externally scan a freight type journal and evaluate the heat therein".*[91] The General Railway Signal Company, long a major supplier of communication and signalling equipment to railroads, advised the Southern Railway, which was seeking an alternate source of supply, that it doubted it could independently design a better hot box detector for Southern, significantly stated: *"* * * we doubt if more development and research would bring about a better method of indicating hot boxes".*[92] Youngwerth of the Erie R. R., which had earlier tested the I. T. T. (Federal Telephone) Orthuber device, reporting on the ability of the Servo detector to substantially eliminate false signals, stated: *"This to say the least, is remarkable when compared with the results we experienced with the Federal Telephone & Radio Corporation detector at North Judson."*[93] In 1956 when Servo first tested the device, with railroad personnel observing, a report reflects the following occurrence: *"The last freight viewed on July 18 had a known crippled car in it which had been set out the day before for a hot box, and it was being towed down to Harmon*

for repair. The car was picked up about 10 miles up the line, and on passing gave a pulse amplitude about seven times the normal journals. We went immediately to the Peekskill Yard to check this, and discovered the box to be smoking slightly, and considerably above other journals in temperature. This provided Mr. Rockwell with the substantiation he required that the Detective had the sensitivity and reliability for this difficult job, and was positively able to detect potentially dangerous journals."

Petition for Rehearing

Record References

• • • •

3. Vol. I, p. 20a**
4. Vol. I, p. 21a
5. Vol. I, p. 22a
6. Vol. I, p. 21a
7. Vol. I, p. 23a
8. Vol. I, p. 149a
9. Vol. I, p. 295a
10. Vol. IV, (PX-438), p. 1252a
11. Vol. III, (PX-121), p. 1084a
12. Vol. III, (PX-41), p. 1012a

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21. Page 5
22. Page 5
23. Page 9

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* All Court of Appeal's Opinion references are to typed copy.

** Plaintiff-Appellee's Appendix so indicated herein.

24. Page 14
25. Page 19
26. Pages 3 & 4
27. Page 7
28. Vol. I, p. 54a
29. Vol. I, p. 54a
30. Vol. I, p. 57a
31. Vol. I, p. 60a
32. Vol. I, p. 61a
33. Vol. I, p. 62a
34. Vol. I, p. 63a
35. Vol. I, p. 63a
36. Vol. I, p. 162a

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68. Page 7, footnote
69. Page 3, footnote
70. Page 7, footnote
71. Vol. I, p. 39a
72. Vol. I, p. 162a
73. Trial Record 4121
74. Vol. III, (PX-5) 942a
75. Vol. III, (PX-288), 1115a
76. Def. Vol. II, (DX-91), p. 2.164
77. Vol. III, (PX-201), p. 1096a
78. Trial Record, pp. 15-16, 35, 38
79. Page 8

80. Vol. IV, (PX-438), p. 1252a
81. Vol. IV, (PX-441), p. 1257a
82. Vol. IV, (PX-343), p. 1137a
83. Trial Record, PX-507
84. Trial Record, DX-109, Tab 7
85. Trial Record, DX-27
86. Trial Record, DX-109, Tab 7
87. Vol. II, (DX-96), p. 2.6
88. Page 7
89. Vol. I, page 41a
90. Vol. I, page 166a
91. Trial Record, p. 2499
92. Vol. III, (PX-283), p. 1114a
93. Vol. III, (PX-216), p. 1097a

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Plaintiff's Exhibit 226 (1101a-1102a)

"Methods of Background Description and Their Utility" by David Robinson, Office of Naval Research (1959), 47 Institute of Radio Engineers Proceedings, pp. 1554-1555:

> "In order to design or evaluate a given infrared system, it is necessary to know the characteristics of the potential targets and backgrounds with which it is expected to deal. The information desired can be put in the form of questions.
>
> 1) What is the probability of detecting a target

in the presence of a given background with a given IR system?

2) What is the probability that a given background will not give a false signal when no target is present?

3) How can one design the system to increase these probabilities?

"Note that it is not only the properties of the background which are involved here. Of vital importance also are the properties of both the target and the IR system which is being used.

* * * *

"* * * Since there are many possible types of backgrounds and, many conditions of viewing it, it would be extremely difficult to use such methods to evaluate an infrared system even if this information were collected. * * *"

Testimony of Dr. Stanley S. Ballard

Q. Could you tell the Court what you understand to be the system that is proposed in that patent? A. Well, the basic problem of hotbox detection is the one that comes to mind first—may I say a few words about that, or do you want me to talk about this specific——

Q. Whatever you think would be enlightening. A. My training has been considerable in military problems which have a certain pattern to them; and I've been interested to compare them with civilian problems such as (1805) this one and to try to feel for some of the similarities and dissimilarities.

The basic problem in infrared instrumentation, however, is always that of identifyng the source of interest, which we call the "target" in military parlance, and I'll call it that if no one objects—identifying the target or

measuring the position or nature of the target. And the target must always be considered in relation to the surroundings—the background, as it is commonly called, although there may not be objects in back of it; but objects surrounding the target.

In fact, all discrimination problems come down to how accurately can you distinguish the target in the presence of whatever surroundings there are.

Now, in a laboratory you can set up an ideal situation where the target is a hot object and everything around it is uniformly at a cooler temperature, and this is child's play to make measurements of this sort.

Outdoors, however, where the weather is changing, where the sun is coming on and off, the ambient temperature is going up and down, the problem is one of entirely greater magnitude.

Another thing that I always think about or try to think about when I am considering infrared systems, (1806) particularly one like this, is that when we are working at these wave lengths, using a thermistor bolometer, for instance, the world looks entirely different from what it does to our eyes. As we look around the room we see things because of the color differences, the reflectivities, the way the light falls on them, and so on.

However, if we replaced our eyes by thermistor bolometers—which I don't propose—and look around, the whole room would look incandescent, because to a thermistor bolometer, to something that is sensitive to those wave lengths, the walls are incandescent, the furniture is incandescent, the people are somewhat more incandescent because their surface temperature is a little higher.

So it is like looking into a fiery furnace and looking for places that are a little more fiery, a little hotter or brighter than other places.

And this is the problem that any infrared device has, indoors or out of doors.

But you can see how much more complicated it is out of doors, since sunlight is very high temperature radiation, and even scattered sunlight, from clouds or from terrain, is a stronger heat source than perhaps the things you might be looking for.

(1807)

Q. You have reviewed some of this material and some of the testimony and is this problem complicated not only by being outdoors in varying atmospheres, but is it complicated because you have a moving target which itself has unpredictable surroundings and unpredictable background? A. Yes, I have been impressed in studying the hotbox problem, which I hadn't done until fairly recently, at the fact that it is a very subtle and complicated problem. In fact, in some ways it is a tougher problem than these military problems that I have been talking about, like the "Sidewinder" missile, for instance, which we all read about now, because you are looking at a dynamic situation that is changing all of the time and you are interested in just a little piece of information, namely, the hotbox flashes by. But this has to be interpreted vis-a-vis all of the surroundings both in space and in time. So I think that it is a very complicated problem and, if I may say so, I believe that the Servo engineers have come out with a very elegant solution of it.

• • • •

Q. Does this differ from what you might term to be an absolute measurement of some kind or other? A. Yes. Absolute measurements, such as you might make with a pyrometer with an internal standard, internal temperature standard, are entirely different from the type of field measurements made in a dynamic situation. In fact, I don't see how the two are much more alike than apples and oranges, to use the old statement.

In one case, you make repetitive long-term, take-your-

time measurements against a carefully controlled laboratory standard. In another case, you have to catch the information on the fly in the presence of usually unfavorable circumstances, which you certainly get in a hotbox detector situation.

(1811)

Q. When reading a stationary target, I understand in order to obtain a reference of some kind or other you employ what is commonly known as a "chopper." Will you describe for us what that is? A. A chopper is a little wheel like a shrunk down fan blade business, it may be several blades, which rotates in the beam or path of light coming from the target through the optical system to the detector. It has several purposes: One is to give a so-called chopping frequency which the electronics can be designed around. It is better to use alternating current systems than direct current systems so as to get away from the drift problem.

Another, is to make it possible to insert a reference temperature into the system. Sometimes this is the back of the chopper blade, but in the more elegant systems the chopper is a mirror and permits the detector to see either the target or when the blade is in place to see a black body source, controlled temperature source, which is off to the side.

Always of course with a device like this you get many impulses a second, whatever the chopping frequency is, so it is quite different from a field measurement where you have to catch things on a fly.

Q. We have had some testimony in this case to the effect that the thermistor bolometer was the most practical selection of a detecting element for reading hotboxes. Could you tell me what you think of the practicability of using a thermistor bolometer in connection with a chopping system? A. We never use a chopping system if you don't have to. It just complicates life. It is another mov-

ing part to go wrong. Also, with a chopping system you have to watch the chopping frequency because if that is greater than the inverse of the time constant of the detector, then you don't get full detector response. The thermistor bolometer is only a medium fast detector, depends on your point of view, so that one cannot chop more than, oh, a hundred or two hundred times a second, I imagine, with a thermistor bolometer and get its full detector sensitivity.

Testimony of Alfred H. Canada
General Electric Co. Infra Red Expert

(634a; 635a; PX-455 Def. Vol. II p. 2.133; 1120a) (Emphasis added).

"Q. What do you mean by 'different kind of problem'? A. The axle box detector demonstrated by British Thompson-Houston was in a subway and not subject to ambient radiation. An initial problem in developing one for American railroads' use was the *necessity of operating this in broad daylight* without solar and ambient interference. This was one of the first problems to which we addressed our work."

• • • •

"Q. Was the angle of view of the detector considered a problem? A. I don't think 'problem' in that sense. As the British Thompson-Houston report had noted and as I think we have noted in these, we had knowledge of the best place to look to see the hottest spot or the most likely spot so they approached it not as a problem. I can recall a number of trips to the New York Central yards to sit there and look at the side of a number of different boxcars to decide where one ought to be in order to see the spots going by. I recall on some types of boxcars the ladders on the side hung down different distances. As

was pointed out in British Thompson-Houston report and in our studies, we desired to locate this (4152) in such a manner that we could see the hot journal box go by, obviously avoid other objects that might also be hot, and avoid any more looks than were necessary either between cars or under the cars; so that we saw wheel shadows going by. At this time; to keep the apparatus simple, we were aiming at simply a device that, without any tripping at particular times, could operate on trackside twenty-four hours a day, turned on, and only see hot journal boxes go by. *This may have been a large order* but it was worthwhile in the project simply because it would eventually contribute to a less complex apparatus.

• • • •

"A few weeks ago, after many months of discussion of the commercial feasibility of a hot journal detector, if it could be successfully developed, we undertook a *pioneer* development to obtain a feel for the problems involved in the detection of a hot journal on a railroad car and then nail down some of these problems with measured numbers that could later be used in the direct development of equipment. As you know, the basis for taking out a pioneer development on such an item, rather than undertaking a direct requisition to supply such an equipment to a railroad or to go directly into a design and development authorization, was that *a serious problem—that of daylight operation—had not been met nor were we very sure of satisfactory solutions in this respect.* The work of the British Thompson-Houston Company on the forerunner of this equipment all was conducted in a subway tunnel, so avoided this most serious problem in hot journal detection.

• • • •

"This shouldn't be taken as discouraging for, after all, this is a pioneer development and, as such, we knew in the beginning that there *were problems that might not yield*

to satisfactory answer. At this time the outlook for sufficient daylight discrimination looks fairly hopeful, but by no means sufficiently assured to start to schedule delivery of hot journal detector units to railroads."

• • • •

Plaintiff's Exhibit 289

FOR USE OF G. E. EMPLOYEES ONLY

X-RAY DEPARTMENT

GENERAL [*GE*] ELECTRIC

ENGINEERING DIVISION

TECHNICAL INFORMATION SERIES

TITLE PAGE

Author

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Subject Classification

Photoconductor Applications

No. ADL–29

Date 6–9–54

Title

EVALUATION OF PbS CELL DETECTION SYSTEM FOR RAILROAD JOURNAL BOX TEMPERATURES

Abstract

A completely automatic [redacted] for the determination

and recording of railroad journal box temperatures has been placed in operation on the Milwaukee Road's main line at Brookfield, Wisconsin.

Reproducible copy filed at

Advanced Development Lab.

No. pages 4

Conclusions

The system as now installed is capable of detecting journal box temperatures exceeding 70°C at train speeds below 35 mph. The signals due to the journal boxes are masked by two spurious ones, the reflection of the sun's radiation by the journal box in the daytime and the signals from the brake shoes at all times. The signals due to the brake shoes can be discriminated against, but short of direct shielding of the journal from the sun's radiation there appears to be no satisfactory answer to the latter.

Testimony of Edward G. Menaker
G. E. Expert at Trial

(861a)

"From what I have seen of it, it is a pretty complicated phenomena because there are several parts of this bolometer amplifier combination which are involved in the results that take place under this circumstance. For one thing, as I have explained, the bolometer goes up in temperature and therefore if no interval takes place between the time the bolometer gets hot and the box comes into view and the next thing it sees is a box which is cooler than the thing it was looking at it for, so it seems this box is relatively cold. So the output then is going to be some low value.

Now if the thing we are looking at before had a temperature, say, of 500 degrees and a journal box came by which was really a hotbox, things were in pretty tough shape, and let's say the box itself was at a temperature of 200 degrees and you couldn't put your hand on it, then the result of that would be that the bolometer says this box is really cool because it's much cooler than the 500 degrees I was just looking at, so it would say this box is cool. Now if some little interval took place between the time that it saw this real hot thing and the time it saw a box, and during that interval it was looking at something cool, then it would depend on how long that interval was, and all of the parts of the amplifier and how rapidly they reassumed to give the original condition in order to determine whether what it would see next would look unduly hot or whether it would look unduly cool or whether it would look the way it should."

"Q. [Master]: Isn't that what you call getting a reference before each reading then? A. I would say that that is essentially getting a reference before each reading."

Testimony of William D. Cockrell, G. E. Engineer

(Trial transcript, pp. 4365-4366).

"Q. Tell me, Mr. Cockrell, when you got into this project, and had this equipment why did you not consider building a detector that was designed substantially like the one that is shown here [Canada and Warshaw work] that had already been developed by G. E.? A. The word "developed" is a little tricky word to use there. This is a study—there again, gentlemen, I am here at the ninth inning, I hope it's the ninth, and this was a business course study in which the man took various parts and put them together I am not sure from the report, Mr. Canada's letter there, rather, to Mr. Hutchins, who is our manager of marketing and might make up such a product as that, that indicates that the whole thing as the picture shows, was never operated, or whether it was the principles had been proven on these photographs or sketch of the Warshaw Patent. The particular idea of this case was to look down, I believe, at the 11°, or something above horizontal obviously, if we are going to put something on the tracks requested by our customers Southern and Norfolk & Western, we would not build that particular equipment.

Q. Did you ever see this model? A. No, I did not.

Q. Did you ever see a model built like this any place? A. No.

Q. Does it exist in the General Electric Company? A. I do not know.

Q. But you have never seen it? A. I have never seen it.

Q. This would not then be a commercial device that you would offer to a railroad or something of that sort; is that correct? A. That is correct."

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IN THE

Supreme Court of the United States

OCTOBER, 1964

No. 1180 [redacted] 154

SERVO CORPORATION OF AMERICA,
Petitioner,

v.

GENERAL ELECTRIC COMPANY,
Respondent.

RESPONDENT'S BRIEF IN OPPOSITION TO PETITION FOR WRIT OF CERTIORARI

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RESPONDENT'S BRIEF IN OPPOSITION TO PETITION FOR WRIT OF CERTIORARI

This is an ordinary patent infringement suit in which the Court of Appeals' holding of invalidity was soundly based on the Court's determination that the subject matter (a particular manner of mounting an infrared hot-box detector) did not meet the statutory requirement of unobviousness (35 U. S. C. § 103).

The opinion of the Court of Appeals is reported at 337 F. 2d 716 and the portions which are pertinent to the petition are reproduced at pages A1-A9 and A19 of the Appendix to the petition.

No unusual question of law is involved. Nor is there any conflict with any decision in any other Circuit. Opportunity exists for litigation on the patent in other Circuits, for there are actual or potential rival manufacturers of hot-box detectors in several other Circuits and potential users (the railroads) can, of course, be found and sued in every Circuit.

Not only is the ground of the Court's decision sound, but the same ultimate result of invalidity would be required on at least two other grounds which the Court of Appeals did not reach. (1) The applicants did not disclose to the Patent Office the best mode contemplated by them of carrying out their alleged invention, as required by 35 U. S. C. § 112. (2) The only claim of the patent directed to the toed-in, upwardly-inclined mounting position which has been used commercially is invalid because detectors so mounted were on sale, sold and in commercial use for more than a year prior to the applicants' first disclosure to the Patent Office of that mounting position and their first assertion that it was part of their alleged invention. The claim is, therefore, invalid under 35 U. S. C. § 102(b) and *Muncie Gear Co.* v. *Outboard Co.*, 315 U. S. 759 (1942).

The Court of Appeals' Decision Is Plainly Right.

The desirability of effective hot-box detectors is undisputed. But that does not render patentable each and every detail of the first infrared hot-box detector to achieve commercial acceptance. One must examine closely just what it is that is claimed to constitute the "invention" of every patent, and indeed of every separate patent claim. *Altoona Theatres* v. *Tri-Ergon Corp.*, 294 U. S. 477, 487 (1935), rehearing denied 294 U. S. 734 (1935).

The heart of the railway hot-box detectors made by the parties to this suit is the thermistor bolometer, a heat-sensitive cell invented by scientists connected with the laboratories of the Bell Telephone organization. Such bolometers became commercially available about 1950 and made possible the production of a number of products which depend upon the ability to sense the temperature of remote objects, including the hot-box detectors with which this suit is concerned. Both parties are licensed by the Telephone Company under its patents relating to such bolometers.

In substance, a thermistor bolometer consists of a pair of small flakes of metallic oxides whose electrical resistance varies inversely with their temperature.

Two such flakes, one active and one inactive, are used in a bolometer. Infrared radiation from the object whose temperature is of interest is focused on the active flake by an optical system similar in function to what is used in an ordinary telescope or camera. The inactive flake is shielded from radiation from any external source. The two flakes are mounted in opposite legs of a bridge circuit in such a way that when the temperature of the active flake is raised by radiation from the object under examination a current indicative of the temperature of the object is caused to flow. This temperature-indicating current is amplified and used to actuate a recording pen. In this way a graph is made indicating the relative temperatures of the journal boxes on each side of the train as they pass through the line of sight of the detectors located on each side of the track.

In order to avoid cluttering the graph with indications of the temperatures of other portions of the train which pass through the detector's line of sight, the instrument is "gated," i.e., the temperature-indicating current from the bolometer is connected to the recording pens only when a journal box is in the line of sight and is disconnected at other times. This is done by an electrical pulse which is generated each time a wheel passes through the field of a magnetic "wheel-trip" attached to the rail at the proper place.

The patent in suit (946a-953a) correctly treats everything thus far described as having been already developed by others; the patent assumes the existence of such apparatus and is concerned solely with the question of where

such a detector should be mounted and how it should be aimed.

It is the thesis of the patent that prior to the joint activity of the patentees, Gallagher and Pelino, engineering employees of plaintiff, Servo, all efforts to make a satisfactory detector had failed because the prior detectors had been mounted at journal box height and aimed inward at right angles to the track with the result that the parts of the journal boxes which passed within their view were the hinged inspection or access lids on the ends of the journal boxes. These lids, the patent correctly says, are not a suitable target at which to aim the detector because they are attached with varying degrees of looseness, are sometimes open and sometimes completely missing. Therefore, the heat graph produced by a detector aimed at the *ends* of the journal boxes from a position at right angles to the track will not reflect with any accuracy or regularity the temperature of the journal bearing itself, which is the real subject of interest. Thus, claim 1 of the patent in suit (952a) represents it to be the invention of the patentees to aim the detector *at any portion of the journal box other than the lids*. It is now established that the inadequacy of the lids as a target for the detector was pointed out to plaintiff, Servo, by railroad representatives with whom the Servo engineers consulted and was therefore not any part of their invention (2.297, 3.10).

Once the inadequacy of the lids as a target was understood, it was readily apparent to any interested and discerning observer that the *sides* of the journal box, near the top to which the journal bearing itself was physically attached, are the parts best suited to give an indication of the journal temperature. Despite the original pretensions of the patent, the selection of the side of the journal box as the target is no longer claimed to be part of the "inven-

tion." Plaintiff's counsel has made this amply plain by saying:

> "We are not trying to get any credit for finding the right spot to look. What we are taking credit for is when it became apparent that this was probably a good spot to look. We picked out the way to look at it." (3.154)

Thus the only "problem" which the patentees now purport to have solved was where to mount the detector and how to aim it in order for the detector to see the side of the journal box which others had selected as the proper target.

Clearly, an instrument aimed at right angles to the track in such a way as to see the lid on the *end* of the box cannot see the sides of the box; to see the advancing side of the box the instrument must be pointed at least partly against the direction in which the train is moving; to see the receding side of the box the instrument must be pointed at least partly in the direction in which the train is moving.

Turning now to the question where such an instrument could or should be mounted, it is at once apparent that no instrument can be mounted *directly in the line of travel of the journal boxes,* for the instrument would be smashed by the first journal box to come along. One is, therefore, forced to mount any such instrument somewhere other than in the line of travel of the journal boxes—*below it or outside of it or both.* All possible mounting positions from which the sides of the passing journal boxes can be observed without being smashed are covered by one or another of the patent claims, even the location at journal-box height which is in violation of the railroads' safety regulations.

The "solution" of this "problem" which is covered by claim 5 of the patent (952a) was to mount the detector at the trackside below the level of the journal boxes and aimed parallel to the track at an upward angle so that the side of each journal box as it passed by would pass through

the detector's line of sight. The mounting position and aiming angle referred to are shown in elevation in Figure 2 of the patent which is reproduced below; they are shown in perspective in Figure 1 which is also reproduced.

Fig 2.

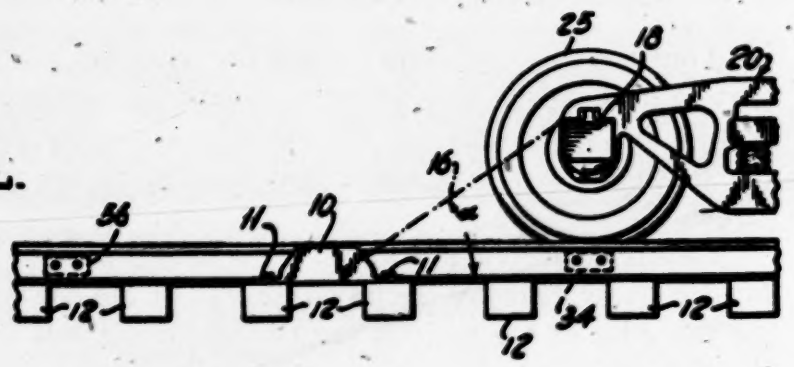
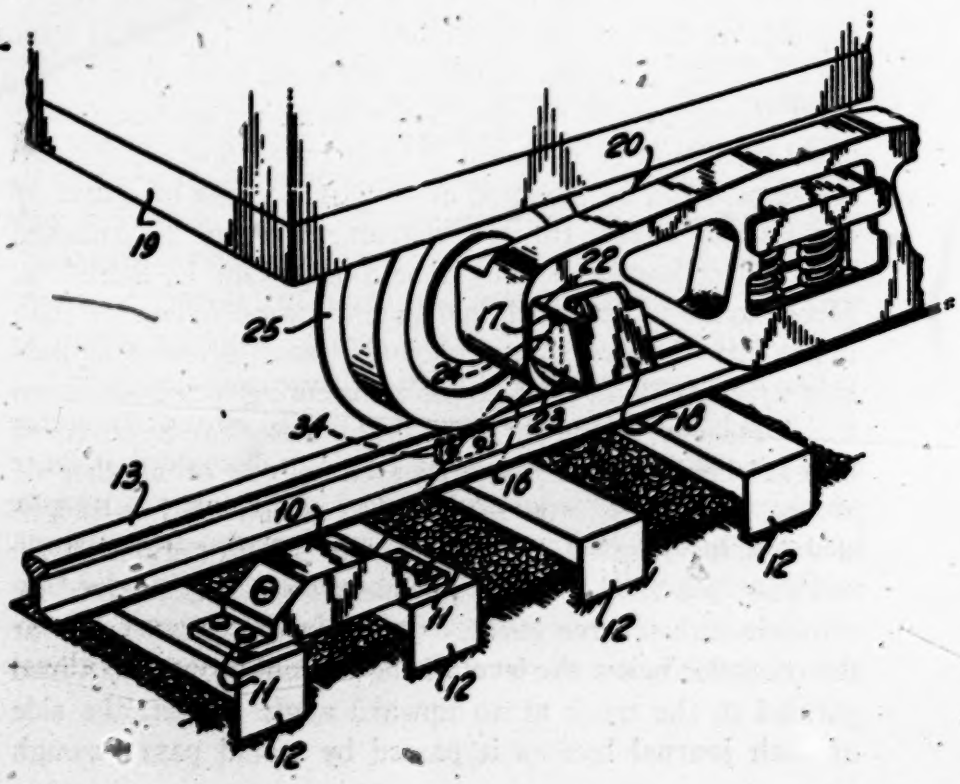


Fig 1.



In attempted support of the patentability of claim 5's low mounting position with a resulting upwardly inclined viewing angle, it was urged that when so mounted the detector was shielded from views of the sun and sky by the car bodies which overhang the journal boxes. But, as the patentees quickly found when they installed their first commercial detectors in this position, the detectors *did* see the sky past certain types of cars (such as tank cars which have no overhang) or over the ends of other cars (such as unloaded flat cars). The claims directed to this parallel-to-the-track mounting position, such as claim 5, were held invalid because "either disclosed or obvious from the prior art" (A8).

To avoid seeing the sky over the ends of unloaded flat cars a more-nearly horizontal line of sight was called for, but with a parallel-to-the-track mounting the presence of a structural member of the truck frame (the spring bolster) precluded such a lowering. To avoid seeing the sky past the sides of tank cars, an inwardly angled line of sight was called for. To angle the line of sight inward required that the instrument be moved to a position further away from the track. The moving of the detector outward and the angling of the line of sight inward brought the line of sight outside the spring bolster which had previously required a sharper upward angle. This permitted the line of sight to be lowered so as to avoid seeing the sky over the ends of unloaded flat cars.

Thus, by moving the detector slightly further from the track and aiming it at an inward and less-steep upward angle, the detector was enabled to see the sides of passing journal boxes without being exposed to the sky past the sides or over the ends of cars.

The adjustments just described were readily and routinely made by the patentees, with collaboration of railway

engineers, within a few months after the sale and installation of Servo's first detectors.

In support of the patentability of this mounting position, with its upwardly and inwardly inclined line of sight which ultimately became the subject of claim 6 (952a), it was urged that this mounting had the virtue not only of avoiding any possibility of seeing the sky but also was such as to avoid seeing any source of heat other than the journal boxes, such as brake shoes, rims, steam pipes, refrigerator condensers, etc., with the result that the underside of the successive cars would constitute a "quiescent background" reference against which the temperature of the journal boxes could be observed and evaluated.

It is true that when the detector is aimed at the proper upward and inward angle, it derives some protection from the possibility of being exposed directly to the sun, and exposure to miscellaneous extraneous heat sources under the train can be minimized, but the patent is not limited to any particular upward or inward angles; and even when mounted in the optimum position thus far determined, the detectors of both parties are exposed to the sky in some instances and are exposed frequently to extraneous heat sources underneath the cars. In addition to occasional direct views of the sun itself, a detector mounted in the optimum position is frequently plagued by sunlight reflected off the journal box itself. For protection against the adverse effects of exposure to direct or reflected sunlight the detectors of both parties are equipped with filters or lenses of materials such as arsenic trisulfide or germanium. The effect of exposure to extraneous heat sources underneath the cars is minimized in the detectors of both parties by causing the output of the bolometer to be connected to the recorder only when a journal box is in the line of sight, i.e., by "gating," as explained above.

Thus, the argument by which plaintiff has sought to impart patentability to the mounting position of claim 6, with its upward and inward angle, by establishing that it involves some extraordinary result, stands thoroughly exposed. And on the contrary, it stands fully established that the mounting position of claim 6 involved nothing more than routine adjustments which would have been, and were, obvious to persons skilled in this art at the time the alleged invention was made. The patent was, therefore, properly held to be invalid for lack of the quality required by § 103—unobviousness to persons skilled in the art at the time. The Court of Appeals was entirely correct in its dispositive statement that:

> ". . . It is the toed-in position described in claim 6 which is the crux of Servo's patent. The so-called invention involved in the toed-in angle of claim 6 was a natural and obvious successor step to the track-level-parallel to the track position of claim 5. Thus the act of Servo in taking one of the known positions disclosed by the prior art and moving the device outwardly from the rail, so as to accommodate the geometry of the truck frames of railroad cars, was not invention; this modification was an ordinary engineering matter obvious to one skilled in the art. Having reached this conclusion, the claimed advantage that the position chosen allows the device to see only the quiescent background of the underside of the car will not render an otherwise unpatentable method patentable." (A9)

Further Grounds of Invalidity

In addition to being invalid for obviousness, as the Court of Appeals held, the patent is invalid for additional reasons not reached by the Court of Appeals.

1. The Entire Patent Is Invalid Because the Patentees Failed to Disclose to the Patent Office the Best Mode Which They Contemplated of Carrying out Their Alleged Invention.

At the time the original application for the patent in suit was filed (November 6, 1956), the applicants had not yet learned that improved results could be obtained by toeing the detector in and lowering its line of sight. Accordingly, the closest approach in the original application to the mounting position which was ultimately adopted was a track-side mounting aimed parallel to the track and at a sharply inclined upward angle (about 35° above the horizontal), the mounting shown in Figs. 1 and 2 of the patent, which are reproduced above (*supra*, p. 6).

In adjusting, in the spring of 1957, the detectors sold to the Chesapeake & Ohio Railroad and to the Reading Railroad, the patentees found that improved results could be obtained by toeing the detectors inward and reducing the upward angle from about 35° to about 25°. Thereafter such a toed-in, lowered-angle mounting constituted, and continued to constitute, the best mode contemplated by the patentees for practicing their alleged invention. Under 35 U. S. C. § 112 they were obliged to disclose it in their application.

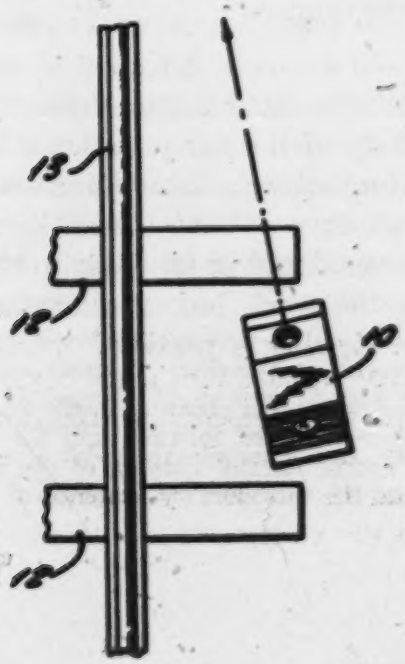
But when the applicants filed a continuation-in-part application to add the toed-in mounting to their disclosure and claims (which they did on June 30, 1958), they carefully refrained from disclosing the main point of the toeing-in (that it permitted reducing the vertical angle of the line of sight from 35° to about 25° so as to avoid seeing over the ends of cars) and instead reiterated the disclosure of the original application with regard to the vertical angle, namely, its statement that the upward angle should be "preferably of the order of 20 to 50 degrees" from the horizontal, and that "very satisfactory results" were obtained "when the viewing angle was approximately 35 de-

grees in the viewing plane which paralleled the adjacent track" (4.193-4.194). By reiterating their praise of a mounting position which had already been abandoned as unsatisfactory, the applicants made a good start toward non-compliance with their statutory obligation to disclose the best mode they contemplated.

Continuing, the continuation-in-part application added diclosures of various other possible "aspects of viewing," including between the rails and aimed at an upwardly inclined angle at the wheel-axle junction (Fig. 8) and between the rails and aimed vertically upward at the same target (Fig. 9).

In Fig. 10 (which is reproduced below) the applicants finally reached the point of disclosing the toed-in mounting, but instead of disclosing the 25° upward inclination which was in fact the "best mode" which they then contemplated they included only a plan view (a view looking down from above) which showed only that the detector was toed in and showed nothing as to its upward inclination.

Fig. 10.



Far from revealing that they had long since determined that with the degree of toe-in shown an upward inclination of 25 degrees produced the best results, they said that

> "Fig. 10 is a plan view of a detector mounted at an acute angle relative to the track *for either horizontal plane aspect viewing or slant aspect viewing.*" (4.192)

When it came to discussing the toed-in mounting, the application continued its failure to reveal what was in fact the best mode known and indeed went to some pains to avoid revealing it, by saying:

> ". . . the detector 10 is mounted at an angle, for example 10 degrees, to the track *and either at track level or between track level and the plane of the journal box.* With the detector 10 at track level, *there is little real difference between the two embodiments* [the parallel-to-the-track and the toed-in versions]; however, with the detector elevated to a position between the track level and the plane of the journal box, there are several real advantages in this embodiment.
>
> "For example, detection of sun reflections is less likely *with the horizontal-plane viewing.* Further, the body of the car provides a background for the detector, *whereas in slant-aspect viewing the background very often is sky.* Moreover, with the detector mounted at an angle to the track and raised from the track bed, greater flexibility of vertical angle viewing is possible." (4.195-96)*

*The discussion quoted above as to the advantages of horizontal-plane viewing was carried forward into the patent (952a, Col. 7, lines 36-45); except for the addition of the italicized words, which follow, to make the introductory sentence of the last paragraph of

True, the 10° angle which had been determined to be optimum was mentioned, but merely as an "example," and this was coupled with the statement that with the detector at track level (where it has in fact remained) there is "little real difference" whether the detector is toed in or left parallel to the track. And far from revealing that the applicants had found an upward angle of 25° to be advantageous when combined with a 10° toe-in, the patent, after a quick reference to the possibility of mounting the detector at any position between rail height and journal-box height (which would encompass any upward angle from zero to something approaching 90°) diverts attention from the rail-level mounting position, which was actually preferred in use because it complied with clearance requirements, by concentrating its praise on viewing in a *horizontal plane,* which would necessarily involve mounting the detector at journal-box height ("the plane of the journal box").

Clearly the effect of this disclosure and discussion, whatever its intent, was not to reveal, but to conceal and obscure, the upwardly inclined viewing angle of 25° which was in fact the best mode the applicants had "contemplated" and which their employer, the patent owner, had in fact recommended, and continues to recommend, for all of its commercial installations.

Clearly the applicants did not comply with their statutory duty to disclose the best mode which they contemplated of carrying out their alleged invention, and the entire patent would have to be held invalid on this account, quite apart from the obviousness ground on which the decision of the Court below was based.

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the quotation read, "For example, detection of *direct sunlight and* sun reflections is less likely with the horizontal-plane viewing," and the deletion of the next sentence (so as to omit its true, but damaging-to-plaintiff's-contentions-in-the-case, admission that "in slant-aspect viewing the background very often is sky.")

2. Detectors Mounted as Called for in Claim 6—Mounted in a Low Position and Aimed at an Upward and Inward Angle—Were Offered for Sale and Sold by Servo, and Were in Commercial Use by Railroads Which Had Leased or Purchased Them, More Than a Year Prior to the First Disclosure of That Mounting Position and Those Aiming Angles to the Patent Office as a Part of the Patentees' Alleged Invention.

This mounting position was arrived at through adjustments made on detectors on the Chesapeake & Ohio and Reading railroads in the spring of 1957. It was thereupon adopted as standard by Servo, and Servo detectors so mounted were sold (or leased) and installed and used commercially for their intended purpose of detecting hot-boxes* more than a year prior to the filing by Servo, on June 30, 1958, of the continuation-in-part application (4.188-4.203) in which such a mounting was first disclosed.

The claim is accordingly invalid under 35 U. S. C. § 102(b) and *Muncie Gear Co.* v. *Outboard Co.*, 315 U. S. 759 (1942).

Petitioner's Argument Based on the Historical Facts Is Without Merit

Under Point I of the Questions Presented, petitioner urges that certain historical facts, which it characterizes as objective criteria of invention, virtually compel a holding that its patent is valid.

The fallaciousness of this argument can be shown in gross by pointing out that the same argument was advanced by petitioner in a pretrial motion for summary judgment seeking an injunction under claim 1 of this patent, the claim

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*Reading installation: 4.17-4.18, 4.66, 4.97, 4.125-4.126, 4.259, 4.261.

Boston & Maine installation: 4.36, 4.130-4.131, 4.253-4.254.
Norfolk & Western installation: 4.84-4.85, 4.255.
Southern Railway purchase: 4.147, 4.155, 4.172.

directed to anything other than end-on viewing, a claim now admittedly unsustainable.*

Even if taken at face value, the fragments of historical "fact" listed by petitioner do no more than to suggest the possibility that something inventive was done some time by someone in the field of hot-box detection—but this is a far cry from indicating, let alone establishing, that any thing inventive was involved in choosing a suitable place in which to mount a hot-box detector.

But the historical "facts" listed should not be taken at face value.

Despite the extent to which the railroads were plagued by hot-boxes and train wrecks caused by overheated journals, they were more interested in the *prevention* of hot-boxes than in their detection. The ultimate response of the Association of American Railroads to the suggestion (by a man named Fattor) of a hot-box detector mounted and aimed in precisely the manner called for in Servo's claim 5 five years before the arrival on the scene of Servo's patentees (2.66, 2.70, 2.83) was to change the name of its hot-box committee in such a way as to make clear it was neither interested in assisting nor authorized to assist individuals in the practical development of such an idea (2.59). Subsequently (about a year after Fattor's oral presentation to the committee and about four years before any action by Servo's patentees), the Association eliminated the committee entirely because of the feeling among railroad people that more time, energy and money ought to be directed toward the prevention of hot-boxes rather than the detection of them after they occurred (2.333-2.334).

Petitioner's references to General Electric's early activities cast no light whatever on the obviousness or un-

*Claim 1 has been withdrawn from suit, though not formally disclaimed.

obviousness of the mounting with which the patent in suit is concerned. General Electric did at one time defer for a time further work on a hot-box detector. There were good reasons for this. Prominent among them was the paradox that although the hot-box problem was then reported to be costing the railroads millions of dollars annually, the railroads were unwilling to make a modest investment in the development of an infrared detector (2.318-2.319).

It is clear that inability to choose a suitable mounting position had nothing to do with General Electric's temporary discontinuance of its work. For General Electric had selected the top of the side of the journal box as a suitable target and had designed a mounting for the detector which enabled it to scan the side of the box from the same journal-high, toed-in position which the present patent discloses as the full equivalent of its upwardly angled mounting.

Under Point 2, petitioner complains that the Court of Appeals disregarded all the findings of the Master and the District Court. The best answer to this is that of the Court of Appeals:

> "Thus the Servo '309 patent is in no sense a basic or pioneer patent; it does not purport to have originated the hot box detector as such. Rather, it teaches the position in which such a detector should be placed and the target at which it should be aimed in order to achieve a commercially feasible permanent installation which avoided certain problems inherent in the prior art."
>
> * * * *
>
> "Thus, the question for the court is whether the discovery of this position as disclosed by the claims of

the patent constitutes invention. We hold that it does not.

"This answer is not contingent upon resolving conflicting testimony, since the basic facts are not seriously in dispute. We simply hold that the standard of invention as applied by the master and the district court is not up to the legal standard required by the governing statute, 35 U. S. C. A. § 103. See *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U. S. 147, 153, 71 S. Ct. 127, 95 L. Ed. 162 (1950)" (A4-A5).

CONCLUSION

This case involves no unusual questions of law and was rightly decided. Accordingly, the petition should be denied.

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June 18, 1965

STATUTES CITED

35 U. S. C.:

§ 102. *Conditions for patentability; novelty and loss of right to patent*

A person shall be entitled to a patent unless—

* * *

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States,

* * *

§ 103. *Conditions for patentability; non-obvious subject matter*

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

§ 112. *Specification*

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, ***and shall set forth the best mode contemplated by the inventor of carrying out his invention.*** (Emphasis added)

* * *

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1964

No. 1180

SERVO CORPORATION OF AMERICA,

Petitioner,

vs.

GENERAL ELECTRIC COMPANY,

Respondent.

PETITIONER'S REPLY BRIEF

Statement

The respondent's memorandum in opposition to the Petition for Certiorari states, but fails to demonstrate, that no unusual question of law is involved in the instant petition. It is readily apparent that the question involved in this petition is, what is the standard of invention under Sec. 103 of the Patent Act of 1952? This question has never been passed upon by this Court. That it is a sufficiently significant public question is inherent in this Court's grant of the Petitions for Certiorari in the *Graham* (No. 11) and *Calmar* (No. 37) cases.

A studied consideration of the Petition for Rehearing in this case (Volume XIII, pp. 90-142; A80-A95), the Petition for Certiorari and the respondent's opposition brief strikingly establishes the latter's

failure to rebut the petitioner's plain demonstration that:

1. The technological nature of the claimed invention in this case, its recognition as "one of the most outstanding advances in railroading" and its relationship to the entry of a small business into the stream of industrial activity make the issues in this case particularly apposite to the Supreme Court's consideration at this time of the question of the applicable standard of invention required to warrant patent protection within the meaning of the Constitution and Section 103 of the Patent Act of 1952;

2. The statement of facts in the Court of Appeals' opinion below was directly contrary to the specific evidentiary findings of both a Master and the District Court,* which contrary statement furnished an apparent basis for the Court's subjective evaluation of the claimed invention as an advance in the art, a *modus* of review which has given rise to the diversity of view in patent cases in the lower courts, necessitating an examination by this Court not only of the question of invention but also of the question of the *application* of the standard of invention.

3. On the facts as found in the *nisi prius* tribunals below the claimed invention presents for the consideration of this Court the upper end of the spectrum of technological contributions which runs from the "gadget type" contribution, through moderate contributions representative of

* And as demonstrated in the Petition for Rehearing, unexplainedly contrary to the great weight of evidence in the 6,541 pages of the record below.

> the increased skills of technicians and workers, to basic contributions, at a time when the pronouncement of this Court on the question of invention, if it is to have a real, lasting and uniform effect, should be based upon an examination of claimed inventions which truly represent the entire spectrum of contributions;

and hence presents a factual posture, not already existing in the *Graham* and *Calmar* cases, which would afford this Court an opportunity to consider the question of invention *and* its judicial application in a broader perspective than that now afforded by the pending cases.

The Issues Presented Are Particularly Apposite to This Court's Consideration of the Basic Question of Invention Under Sec. 103 of the Patent Act of 1952

The claimed invention was described by the Master below as follows (A56-57):

> "Those who sought to solve the hot box journal problem were faced with many perplexing difficulties * * * it was * * * necessary to take into consideration many factors such as: the type of journal bearings, whether friction or roller, the shape of the journal box, the varying diameter of the wheels, the sway or motion of the train, as well as its speed, the portions of the journal box to be scanned, whether the lid, top, bottom, leading or trailing sides, the heat sources on the train, such as brake shoes, steam hoses, etc., and especially outside disturbing factors, the sun,

clouds, snow, reflections and any unfavorable background."*

* * * *

"In experimentations in the hot box field it was early discovered that due to the tendency of the bolometer [infra red heat sensing element] to pass through to the amplifier false signals (those not emanating from journal boxes) it was necessary to build into the scanner some reference background that the bolometer would be looking at when not viewing journal boxes. Shutters were tried and attempts were made to so synchronize the shutter blades, with reference to passing journal boxes, as not to allow the bolometer to see anything but the back of the turning blades except when a journal box came in view. Due to the varying speeds of trains and the synchronizing problems, shuttering proved impracticable. Servo discovered another way to eliminate this most troublesome of all scanning problems. The underside of the car Servo found to be under all conditions, winter or summer, day or night, near ambient temperature, thus furnishing a much sought and desirable reference background and, for the first time, so mounted its

---

* Respondent's brief at pp. 7-8, while understandably negative, apparently cannot avoid some recognition of the technical problems which the respondent's expert infra red engineers described as not admitting of "very satisfactory solutions" (A101) and as a problem of a "large order" (A101). The Office of Naval Research (1959) has stated that "In order to design or evaluate a given infrared system it is necessary to know the characteristics of potential targets and backgrounds" and even given this information "Since there are many possible types of backgrounds and, many conditions of viewing it, it would be extremely difficult to use such methods to evaluate an infrared system even if this information were collected" (A95).

scanning device as to take full advantage of this discovery.

"I find from the evidence before me that Servo made a true break through in the hot journal box detection field and that there is novelty, utility and unobviousness in the discovery."

The respondent's reply brief appears to us to involuntarily stamp this contribution, and the decision below, as significantly pertinent to the dominant legal and public issue in the field of patents today, namely, the nature of the advance or contribution required to constitute an "invention" realistically promoting the progress of science within the meaning of Sec. 8, Article I of the Constitution.

The present posture of this problem as it has evolved from the adoption of the Constitution through a series of judicial decisions and legislative enactments, all at different mileposts in the progressive road to our present day technological and economic society, has been set forth by Judge Learned Hand in *Lyon* v. *Bausch & Lomb Optical Co.*, 224 F. 2d 530, 535-6 (C.A. 2, 1955).* He concludes that the Congressional intent in writing into the patent statutes the test that the standard of invention has been met when the advance was one which would not have been "obvious * * * to a person having ordinary skill in the art" restored the rule of *Hotchkiss* v. *Greenwood,* 11 How. 248 (U.S. 1850). He then finds (p. 535), where competent workers in the field had for ten years been seeking a solution; where there had been a number of attempts, none satisfactory; where

* Reprinted for convenience in Appendix to this Reply Brief, page i.

nothing in the implementary arts were lacking to put the advance into operation; and when the subject of the invention was disclosed, it supplanted the existing practice and occupied substantially the whole field, that such a combination of evidence completely demonstrated that the contribution had not been "obvious" to a person having ordinary skill in the art within the meaning of the intent of Congress in enacting Section 103 of the Patent Act of 1952.

That petitioner's claimed invention overwhelmingly meets this test can hardly be questioned.*

The respondent's brief itself appears to us to grudgingly admit that the subject matter of the patent in suit was "the first infra red hot-box detector to achieve commercial acceptance" (p. 2); it admits that heat sensing elements capable of being embodied in such detector were "commercially available about 1950" (p. 2); it admits that the detector which is the subject matter of the claimed invention avoids the problems identified by the Master above (p. 8); it admits that the historic facts suggest "the possibility that something inventive was done sometime by someone in the field of hot-box detection" (p. 15) (apparently overlooking its earlier concession that the subject matter of the patent in suit *was the first* infra red hot-box detector to achieve commercial acceptance and the findings of the Master that the invention of the patent in suit constituted a "breakthrough in the hot journal box detection field" (A57) and (A37) was the "first working answer" to the problem); and finally, it admits the "inability" of the General Electric Company

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* See Petition for Certiorari herein, pp. 2-4, 22-25.

"to choose a suitable mounting position" and its deferment of work on the project until the appearance of petitioner's device on the market (p. 16).

There can be little doubt in these circumstances that the claimed invention of the patent in suit more than meets the test of invention established by Congress in the Patent Act of 1952 and that the Court of Appeals in holding simply that the patent did not meet the legal standard required by *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U. S. 147 (1950), not only rejected the standard intended to be set by Congress in its enactment of Section 103 but also erroneously applied the decision of the *A & P* case to a set of facts and a technological contribution far removed from that which may reasonably have prompted the decision in that case.

The significant factor on this Petition for Certiorari with respect to the claimed invention of the patent in suit is that, if it was considered by the Court at the time of the ruling in *Hotchkiss* v. *Greenwood*, at the time of the decision in *Cuno Corp.* v. *Automatic Devices Corp.*, 314 U. S. 84 (1941), at the time of the decision in *Jungersen* v. *Ostby & Barton Co.*, 335 U. S. 560 (1949) or at the time of the ruling in the *Great Atlantic & Pacific Tea Co.* case (1950), we believe the facts are such that it would meet the test of invention applied by those Courts and hence, we suggest to this Court that it presents a particularly pertinent case for review with a view toward the Court bottoming its expected pronouncement of the proper standard of invention upon a sufficiently broad factual and technological basis to assure a real, lasting and uniform effect to its decision on the subject of invention within the meaning of the Constitution.

The Court of Appeals' Error as a Court of Review Is Exemplary of the Reason for the Wide Divergency of View in the Lower Courts on the Question of Invention

In *Lyon* v. *Bausch & Lomb Optical Co., supra,* 536, Judge Learned Hand observed, on the test of obviousness that:

> "* * * this became the standard rubric and was applied in many cases. The variants were numberless and 'invention' became the most baffling concept in the whole catalogue of judicial efforts to provide postulates for indefinitely varying occasions."

The apparent reason for such a condition seems to exist in the judicial tendency to view patent cases differently from other cases where the record facts control the judicial decision. The tendency of the courts to view and evaluate the invention subjectively lies at the root of this problem. Perhaps the sharpest analysis resides in *Armour* v. *Wilson & Co.,* 274 F.2d 143, 156 (C.A. 7, 1960) where that Court sat, in banc, for the specific purpose of resolving the rationale of decision in patent cases and found:

> "After surveying the field since Graver in 1948 and A. & P. in 1950, and observing the variegated colors produced from the seeds we all have widely sown, we have concluded that the rules governing the trial of patent cases are no different than in other types of civil litigation, and further, that the scope of our review on appeal follows the same pattern. We look at the *findings of fact as to in-*

vention in the way that such factual determinations are generally reviewed. We examine the *standard of invention* applied to these facts as a question of law, as we have done in other areas."

The Court of Appeals statement of facts to which it applied the standard of invention in the instant case has been demonstrated beyond the possibility of any reasonable refutation to be directly contrary to the facts as found by two trial tribunals below,* *i.e.* by the Master and the District Judge who both separately and independently found such facts.

These circumstances present for this Court, not only the opportunity to define invention, but the opportunity, at the same time to indicate the proper process of judicial resolution in patent cases to avoid the unstable conditions in applying the test of invention observed upon in the *Lijon* and *Armour* cases.

The Significance of Respondent's Tangential Argument on "Best Mode" and Prior Use

In this case which has been carried to this Court on the basic issue of invention, the respondent nevertheless devotes a substantial portion of its answer to an argument that the patent is invalid because the patentees failed to disclose the best mode by which they contemplated carrying out the invention and, that it is invalid by reason of some asserted prior use. Yet, it concedes that these questions were not passed upon by the Court of Appeals below. It fails, how-

* Petition for Certiorari, A7 to A22; Petition for Rehearing, Vol. XIII, pp. 10-38.

ever, to note that both of these questions were extensively briefed and argued before the Special Master and extensively briefed and argued before the District Court, both of which tribunals decided these questions in favor of the petitioner. If an objective clue is sought among the contrary claims which always exist in an adversary proceeding, we think that the respondent's inapposite reference to these matters suggests an attempt to divert attention from the substantial nature of the question of invention presented by the Petition for Certiorari in this case.

Conclusion

This case involves a predominant legal and public issue in the field of patents relating to the question of invention within the Constitution; it presents facts and a level of scientific accomplishment which do not exist in the cases presently pending before this Court;*

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* See Appendix hereto, p. iii. It is unfortunate, and perhaps it is a significant part of the present problem, that most of the landmark cases passed upon by this Court in the patent field, appear to involve relatively simple subject matter, such as the new door knob of *Hotchkiss*, the method of making jewelry in *Jungersen*, the ~~new grease fitting~~ of *Cuno*, and the supermarket counter of *A&P*. These really represent a negative view, *i.e.*, what *does not* constitute invention. The law with respect to invention, if it is now to be expressed by this Court, would benefit by a contemporary consideration of the subject matter of the patent in suit which we believe, certainly *prima facie*, exhibits a meritorious technical contribution, and hence presents, also *prima facie*, a possible opportunity for an affirmative statement by this Court with respect to what *does* constitute invention.

and it presents, we think, a plainly unjust result. Accordingly, the petition should be granted.

July 16, 1965

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Certificate of Service

Copies of this Reply brief of Petitioner have been served on Respondents by mailing copies to Leonard G. Muse, Woods, Rogers, Muse & Walker, 105 Franklin Road, S.W., Roanoke, Virginia 24004, and to Charles H. Walker, Fish, Richardson & Neave, 277 Park Ave., New York, N. Y. 10017, this 16th day of July, 1965.

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Attorney for Petitioner

APPENDIX TO REPLY BRIEF

Lyon v. *Bausch & Lomb Optical Co.*, 224 F. 2d 530, 535-536 (C.A. 2, 1955):

"The Courts of Appeal have very generally found in the recent opinions of the Supreme Court a disposition to insist upon a stricter test of invention than it used to apply—indefinite it is true, but indubitably stricter than that defined in § 103. Indeed, some of the justices themselves have taken the same view. The act describes itself as a codification of existing law, as it certainly is in the sense that the structure of the system remains unchanged. Moreover those decisions that have passed upon it have uniformly referred to it as a codification, although so far as we have found none of them has held that § 103 did not change the standard of invention. And so the question arises whether we should construe § 103 as restoring the law to what it was when the Court announced the definition of invention, now expressly embodied in § 103 or whether we should assume that no change whatever was intended. To decide that qeustion it seems desirable to look briefly backward.

"From 1793, when the second patent act was passed, until the Act of 1952, the only statutory standard for invention was that the discovery should be 'new and useful'; and indeed the Act of 1952 itself repeats this same test in § 101. Congress did not try to define it but left it to the courts to develop by precedent. So far as we can find, it was not until 1850 that the Supreme Court made any such attempt; so that, although the disclosure must be 'new,' it was so, provided it had not been published or in public use and

was original. However, in *Hotchkiss* v. *Greenwood,* 11 How. 248, 267, 13 L.Ed. 683, the Court imposed an authoritative gloss upon the word, which it put in the following words: 'unless more ingenuity and skill in applying the old method' were necessary 'than were possessed by the ordinary mechanic acquainted with the business, there was an absence of that degree of skill and ingenuity which constitute essential elements of every inveniton. In other words, the improvement is the work of a skillful mechanic, not that of the inventor.'

* * * *

"Thereafter this became the standard rubric and was applied in many cases. The variants were numberless; and 'invention' became perhaps the most baffling concept in the whole catalogue of judicial efforts to provide postulates for indefintely varying occasions. However, the Court never formally abjured it; nor has it ever substituted any other definite test. Even *Cuno Enginering Corp.* v. *Automatic Devices Corporation,* 314 U.S. 84, 62 S.Ct. 37, 86 L.Ed. 58,—which in expression probably was the furthest departure—recognized the continued authority of *Hotchkiss* v. *Greenwood, supra;* 314 U.S. at page 90, 62 S.Ct. at page 40: 'if an improvement is to obtain the privileged position of a patent more ingenuity must be involved than the work of a mechanic skilled in the art.' Again 314 U.S. at page 91, 62 S.Ct. at page 40: 'The principle of the *Hotchkiss* case applies to the adaptation or combination of old or well known devices for new uses.' "

The Subject Matter of the Patents in Cases Pending Before the United States Supreme Court

Graham v. *John Deere Co.*, No. 11. The patent in suit involves a clamp for shank plows and the standard of invention under Sec. 103.

Calmar, Inc. v. *Cook Chemical Co.*, No. 37. The patent in suit involves a hold-down cap for a liquid sprayer and the standard of invention under Sec. 103.

Haseltine Research Inc. v. *Ladd*, No. 57. The patent involved in this case relates to a microwave switch. The Petition for Certiorari specifically notes that the issues raised on the Petition do not involve an understanding or a consideration of the subject matter of the patent and the standard of invention under Sec. 103 is not involved.

Brenner v. *Manson*, No. 58. The patent in suit or the subject matter of this patent is not disclosed in the Petition for Certiorari; it does not involve the question of the standard of invention under Sec. 103; and the Petition states that the technology involved is irrelevant for the purposes of the Petition.

Office-Supreme Court, U.S.
FILED
OCT 9 1965
JOHN F. DAVIS, CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1965

No. 154

SERVO CORPORATION OF AMERICA,
Petitioner,

vs.

GENERAL ELECTRIC COMPANY,
Respondent.

PETITIONER'S SUPPLEMENTAL BRIEF

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1965

No. 154

SERVO CORPORATION OF AMERICA,
Petitioner,

vs.

GENERAL ELECTRIC COMPANY,
Respondent.

PETITIONER'S SUPPLEMENTAL BRIEF

We are filing this Supplemental Brief to call to the Court's attention a very recent development which reflects the concern of the Department of Commerce lest Supreme Court rulings on the patent cases now accepted for review shall be incorrectly interpreted, in regard to the applicable standard of patentability.

In a letter dated October 8, 1965, the General Counsel for the Department of Commerce has expressed to the Office of the Solicitor General a Government interest in and concern with the subject matter of the above-identified petition for certiorari. The Department letter observes that:

"The standard of invention question now before the Court concerns whether enactment of Section 103 superseded the Supreme Court's decision in the *A&P* v. *Supermarket* case in 1950. The question *Servo* presents is whether

the novel arrangement or disposition of even an old element in the combination of old elements removes the matter from the strict interpretation of the *A&P* case. It is possible that this fact situation would be useful to the Court in permitting it to issue positive guidelines since the invention at stake in *Servo* was one which was particularly meritorious. The Servo invention was an infra red hot-box detector used on railroads to prevent accidents resulting from undetected hot-boxes. In short, the *Servo* case could serve as a vehicle for drawing lines between patentable and unpatentable combinations of old elements."

A copy of said letter is attached to and made a part of this Supplemental Brief.

CONCLUSION

For the reasons stated in the Petition, and in our Reply Brief and this Supplemental Brief, the Petition for a Writ of Certiorari should be granted.

October 9, 1965

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CERTIFICATE OF SERVICE

Copies of this Supplemental brief of Petitioner have been served on Respondents by mailing copies to Leonard G. Muse, Woods, Rogers, Muse & Walker, 105 Franklin Road, S.W., Roanoke, Virginia 24004, and to Charles H. Walker, Fish, Richardson & Neave, 277 Park Ave., New York, N. Y. 10017, this 9th day of October, 1965.

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APPENDIX TO SUPPLEMENTAL BRIEF

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Washington, D.C. 20230

October 8, 1965

Honorable Thurgood Marshall
Solicitor General
Department of Justice
Washington, D. C.

Dear Mr. Solicitor General:

This Department has been asked to express an interest in the Government's filing a brief *amicus curiae* in a case now pending on petition for a writ of certiorari before the Supreme Court, *Servo Corporation of America* v. *General Electric Company*.

As a matter of policy, we do not generally recommend Government intervention in patent cases between private litigants unless there is a very significant question of public interest. In the *Servo* case, an issue has been raised which is currently before the Supreme Court in other cases (*Graham* v. *Deere, Colman* v. *Cook, United States* v. *Adams*) which the Court has agreed to review. These essentially raise the question of the standard of patentability under Section 103 of Title 35 of the U.S. Code. It appears that the legal issues are generally the same but the fact situations involved in the other cases before the Supreme Court differ from that of the *Servo* case.

Since the Supreme Court has already taken review in other cases on this question, we believe it is important that you consider the desirability of requesting the Court to take review of the *Servo* case to prevent any denial of justice that might result from finality of the decision

below in the event that the Court's decision on the issues presently before it favors Servo's position. Also, there is an additional factor in the *Servo* case which should be brought to your attention and considered in light of the other issues before the Court.

The standard of invention question now before the Court concerns whether enactment of Section 103 superseded the Supreme Court's decision in the *A&P* v. *Supermarket* case in 1950. The question *Servo* presents is whether the novel arrangement or disposition of even an old element in the combination of old elements removes the matter from the strict interpretation of the *A&P* case. It is possible that this fact situation would be useful to the Court in permitting it to issue positive guidelines since the invention at stake in *Servo* was one which was particularly meritorious. The Servo invention was an infra red hot-box detector used on railroads to prevent accidents resulting from undetected hot-boxes. In short, the *Servo* case could serve as a vehicle for drawing lines between patentable and unpatentable combinations of old elements.

We do not suggest that you intervene in this case on one side or the other but suggest consideration be given to requesting only that the Supreme Court grant the petition for certiorari in order that the issues of the Servo case may be considered along with the other important issues of the standard of patentability which are before the Court.

Sincerely yours,

/s/ Robert E. Giles
ROBERT E. GILES

CC: Mr. Fleming

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1965

No. 154

SERVO CORPORATION OF AMERICA,
Petitioner,

vs.

GENERAL ELECTRIC COMPANY,
Respondent.

PETITION FOR REHEARING ON PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

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Statement

This petition for rehearing in this Court is made after the finding by a Special Master, who extensively considered the record facts, over a period of eight months, that the patent, U. S. Patent No. 2,880,309, "stands aloof unanticipated by the prior art", "has the characteristics of a 'pioneer' patent" and, "constituted a major breakthrough in its field".

The petition is made after the District Court, confirming the Master, held (A37):

> "The best answer to G. E.'s defense of obviousness is the cold fact that notwithstanding the great need for a successful hot box detector by

> the railway industry and notwithstanding the constant quest for a solution to the problem, it was not until Servo located the proper viewing position that the device became a practical answer. The problem of locating the detector at a point which would view the most favorable spot of the journal box on a moving car under changing conditions, taking into consideration other factors of heat, light and atmosphere obtaining, was a difficult problem to solve, and as before stated, Servo was *the first to come up with a working answer*. The Court does not feel that finding this answer was as simple as defendant urges, or that it possessed the obviousness referred to and described in the Patent Act, which would defeat it. (35 U.S.C. 103)"

It is also made after several revisitations to Judge Bell's opinion in the Court of Appeals, where, if this Court refers to the Petition for Rehearing in the Court of Appeals (A80-A95),* it is plain that the judicial analysis and rationale was strikingly subjective and quite remote from this Court's fundamental observations in the *Graham* and *Calmar* cases (Nos. 11 and 37, decided February 21, 1966) where it stated (34 LW 4119, 4121):

> "Manifestly, the validity of each of these patents turns on the facts".

and,

> "The Hotchkiss formulation, however, lies not in any label, but in its functional approach to questions of patentability."

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* Servo Corp's. Petition for Rehearing is printed in full in pp. 90-142 of Vol. XIII of the certified transcript of record.

On the facts as found by the Master and the Trial Court, we can find no reasonable, just or explainable basis for the result reached in Judge Bell's opinion in this case, and the contrary result reached in the *Adams* case.

We are cognizant that this Court cannot review individually every patent case brought before it but where the petition for rehearing in the Court of Appeals was held a record three and a half months and the Petition for Certiorari in this Court was held ten months, it is at least apparent that the questions presented are not easily resolved.

When these factors are considered, together with the fact that the Department of Commerce expressed a strong interest in the review of the question of invention in this case and with the fact that it presents a challenge of no small skill to distinguish this case from the *Adams* case on the basis of the facts as found by the nisi prius tribunals below,* it would seem that simple homespun justice would at least suggest that the issue be remanded to the Fourth Circuit Court of Appeals for consideration in the light of the *Adams* and *Calmar* opinions.

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* A matter which we have asked the Court of Appeals for the Fourth Circuit to attempt. There has never been an explanation for the rejection of the facts as found below.

Question Presented

The question presented by this Petition for Rehearing is:

1. Whether, while this Court still has jurisdiction, this case should be remanded to the Court of Appeals for the Fourth Circuit to consider the facts in the light of the opinions of this Court in the *Adams* and *Calmar* cases, because:

(a) The Fourth Circuit Court of Appeals applied the shopworn or "label" test which this Court has now rejected as an incorrect test, namely, that "no new or unique combination of old ideas producing or performing a different or additional function has resulted";*

(b) The Fourth Circuit Court of Appeals, before this Court's decision in the *Calmar* and *Adams* cases, simply and incongruously held** (A5 App. to Pet. for Cert.):

> "This answer is not contingent upon resolving conflicting testimony, since the basic facts are

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* 337 F.2d 716, 719. Cf. *Graham* v. *Deere*, (U. S. 1966) 34 L.W. 4119.

** The Petition for Certiorari flatly states, and this Petition for Rehearing reaffirms that:

> "As we believe we overwhelmingly demonstrated in the Petition for Rehearing the statements of fact in the Court of Appeals' opinion are directly contrary to the specific evidentiary findings of both the master and the district court, and to the substantial weight of the evidence. This is patently apparent from an examination of the Petition for Rehearing and, as objectively as we are capable of considering it, we cannot comprehend the Court of Appeals'

not seriously in dispute. We simply hold that the standard of invention as applied by the master and the district court is not up to the legal standard required by the governing statute, 35 U.S.C.A. 103. See *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U.S. 147, 153 (1950)."; and

(c) The Department of Commerce, charged with the administration of the Patent Laws, the administration of which was specifically noted by this Court in the *Calmar* case, has expressed its administrative interest in the review of this case, implicit in which is the solicitation of this Court's resolution of a question of law relating to combination patents *viz.* the impact of a new element in the combination, which element plainly and uniquely brought to life the first successful and widely adopted commercial device.*

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statement that "the basic facts are not seriously in dispute." Sharp proof of the dispute, which was resolved by the triers of fact in favor of petitioner, is the fact that G. E. filed 200 separate objections to the Master's Report, more than a hundred of which were directed to the findings of fact relating to the invention of the '309 patent, contending that the master was incorrect on the facts." (Petition for Certionari, pp. 21-22)

* P. 25, Petition for Certiorari: "The invention of the patent in suit was the only such device to utilize, as a new element, the environment of the target itself, the underside of the car in conjunction with an orientation of the device which constantly exposed it upward towards the sky. As the inventor noted: "It is virtually impossible to achieve the results we are obtaining unless the bottom of the car is used as a reference to which journal temperature is compared. Therefore the orientation [which at the same time avoided other heat sources on the train] is the key to the entire system". As the master found:

"This was the discovery of the fact that using the tools at hand a device could be made and so oriented as to success-

Comparative Facts Adams and Servo

A comparison of the facts as stated by this Court in the *Adams* case and of the facts as they substantially exist in the record in the *Servo* case demonstrates, at least *prima facie,* based upon the limited showing that can be made in this Petition, that the contrary results are incongruous. As a necessary corollary, the contrary result could be unjust. A re-examination by the Court of Appeals now is, we earnestly believe, strongly suggested.

Adams	*Servo*
I. "For several years prior to filing his application for the patent, Adams had worked in his home experimenting on the development of a wet battery. He found that when cuprous chloride and magnesium were used as electrodes in an electrolyte of either plain water or salt water that an improved battery resulted." (P. 4132)	I. "Those who sought to solve the hot box journal problem were faced with many perplexing difficulties. Aside from the selection, assembly and housing of the internal components of an apparatus designed to view journal boxes of passing trains, it was also necessary to take into consideration many factors * * *." (A52-Appendix to Petition for Cert.)

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fully scan and record only hot journal boxes, to the exclusion of all unwanted and disturbing signals and this could be done by taking advantage of the fact that the underside of the cars provided a uniform reference background."

This case is not wanting in the identification of a new or different element to constitute invention."

Adams

"Wood recognized that the difficulty with magnesium electrodes is their susceptibility to chemical corrosion * * *." (P. 4133)

Servo

"Cornelius A. Gallagher, one of the two inventors in the '309 or 'Orientation' patent, was on the stand for the greater part of some six days, during which time he was subjected to an extended and elaborate cross examination. I deem it fair to say that all who heard him were impressed with his candor and with the forthright manner in which he answered questions without equivocation.

". . . we were sitting down one day and I had the *Car Builders Cyclopedia* in front of me as we were reviewing the failures that my circuit had encountered on not being able to get a *true ambient reference* * * * it occurred to us that the car was always in the

Adams	*Servo*
	environment of the target and subjected to the same conditions, whether it be in winter or summer. * * * and it went rather rapidly from that point on to where we would consider looking in such a manner as to get at the bottom of the car for this referencing and still sweep the journal and miss the remainder of the hot sources." (A53-A54)
	"Prior to this, * * * Servo * * * had conducted many experiments * * *" (A54)
II. "Less than a month after filing for his patent, Adams brought his discovery to the attention of the Army and Navy. Arrangements were quickly made for demonstrations before the experts of the United States Army Signal Corps. The Signal	II. "The General Electric Company engineers who had worked on the problem for about 10 years, stated during the course of this work 'a serious problem—that of daylight operation—had not been met nor were we very sure of satisfactory solutions in this

Corps scientists who observed the demonstrations and who conducted further tests themselves did not believe the battery was workable. Almost a year later, in December 1942, Dr. George Vinal, an eminent government expert with the National Bureau of Standards, still expressed doubts. He felt that Adams was making 'unusually large claims' for 'high watt hour output per unit weight,' and he found 'far from convincing' the graphical data submitted by the inventor showing the battery's constant voltage and capacity characteristics. He recommended, 'Until the inventor can present more convincing data about the performance of his [battery] cell, I see

respect' and that prior work of a British G.E. affiliate 'avoided this most serious problem' by testing a device in a tunnel. They also stated that to locate a heat sensing device in such a manner as to avoid extraneous heat sources and observe only journal boxes, without shuttering, on a continuous basis would be a 'large order.' (P. 12, Petition for Cert.)

A memorandum of the Association of American Railroads dated March 15, 1957 states:

"* * * work on various devices * * * for the now defunct [A.A.R.] Committee on Hot-Box Alarm Devices had generally led to the conclusion that there was no no-

Adams	*Servo*
no reason to consider it further'." (P. 4133)	ticeable relationship between journal boxes and bearing temperaatures alone and that wind velocity and ambient temperatures would have a pronounced effect on any such relationship. "Furthermore, to be effective, the hot-box detector would have to have some automatic compensation for changes in ambient temperature. If the Servo Corporation detector contains such compensation, it is not evident from the description of the device." (P. 15, Petition for Cert.)
III. "However, in November 1943, at the height of the war, the Signal Corps concluded that the battery was feasible. The Government thereafter entered into contracts with various battery	III. "It is also clear from the record that General Electric ceased its activities in the hot box detector field near the close of the year 1955. At that time its experimental department reported

Adams

companies for its procurement. The battery was found adaptable to many uses. Indeed, by 1956 it was noted that 'there can be no doubt that the addition of water-activated batteries to the family of power sources has brought about developments which would otherwise have been technically or economically impossible.' See 10th Annual Battery Research and Development Conference, Signal Corps Engineering Laboratories, Fort Monmouth, N. J. 440 (1950). Also, see Finding No. 24, 330 F.2d., at 632.

"Surprisingly, the Government did not notify Adams of its changed views nor of the use to which it was putting his device, despite his re-

Servo

the infrared detection of hot journal boxes as feasible but involving some difficult problems in practical application. * * * On April 10, 1958, General Electric's engineers went to Salisbury, North Carolina, where they examined the Servo installation. Members of the party photographed the installation, brought back with them Southern's drawings of the installation, and examined a diagram of the installation made by Servo. From the report made the following day, it was clear that the party, had gained valuable information which reflected much, if not all, of Servo's engineering development and field experimentation." (337 F.2d 716, 723 (1964))

Adams	*Servo*
peated requests. In 1955, upon examination of a battery produced for the Government by the Burgess Company, he first learned of the Government's action. His request for compensation was denied in 1960, resulting in this suit." (P. 4133)	"General Electric learned that which it needed to know through Southern. . . ." 337 F.2d 716, 725 (1964).
IV. Compare this Court's analysis of the prior art in Adams, pp. 4133 and 4134 under Section IV of the opinion.	IV. Compare the Master's analysis of the prior art in detail at A64-A77 of Appendix to Petition for Certiorari.
V. The court below found, and the Government apparently admits, that the Adams battery "wholly unexpectedly" has shown "certain valuable advantages over other batteries" while those from whom it is claimed to have been copies were long ago discarded. (P. 4135)	V. "The Servo detector is also characterized in the statements of many railroads as "one of the most outstanding advances in railroading" (Reading RR, December, 1956, 1338a); as a "very forward step in attempting to solve a very difficult problem" (Motorola Communications and Electronics, Inc., April

Adams	*Servo*
	1957, 1339a); as representing "the newest method yet devised to help the railroads in their constant struggle to overcome the hotbox problem" (Boston & Maine Railroad, September-October, 1957, 1344a); as "One of the greatest aids to railroading in many, many years" (C & O 1958 Annual Report—PX-76); as "tremendously successful" and producing "solid achievement" (B & M, 1959, 1346a); as a "phenomenal success" (Interstate Commerce Commission — PX-527); and that it was a "pioneer" effort (AAR, 1080a). (P. 18, Pet. for Cert.)
VI. "the Adams invention was the first practical, water-activated, constant potential battery which could be fabricated and	VI. The short answer to this is that of the many experts, versed in the art, who tackled the problem, none solved it prior to Gal-

Adams

stored indefinitely without any fluid in its cells." (P. 4132)

Servo

lagher and Pelino. What, with a backward look, now seems obvious, then, with a forward look, remained elusive. A few even reached the conclusion that the task was almost impossible. * * * While G.E. insists otherwise, there was no real breakthrough or solution of the problem until Servo's Gallagher and Pelino collaborated. (A63, A52 App. to Pet. for Cert.)

Conclusion

The facts of this case strongly call for an examination by the Court of Appeals in the light of the *Adams* and *Calmar* cases. This is properly the function of the Court of Appeals, and accordingly, this petition most earnestly and respectfully requests this Court to consider a remand for this purpose.

March 31, 1966

Respectfully Submitted

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Certificate of Counsel

The foregoing Petition for Rehearing is believed to be meritorious, is presented in good faith and not for delay, and is restricted to grounds specified in Rule 58 of this Court.

THOMAS F. REDDY, JR.
Attorney for Petitioner

Certificate of Service

Copies of this Petition for Rehearing have been served on Respondents by mailing copies to Leonard G. Muse, Woods, Rogers, Muse & Walker, 105 Franklin Road, S.W., Roanoke, Virginia 24004, and to Charles H. Walker, Fish, Richardson & Neave, 277 Park Ave., New York, N. Y. 10017, this 31st day of March, 1966.

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